for use with sets featuring remote control – it's worth testing the batteries in the transmitter unit before getting involved in fault-finding in the remote-control circuitry.

So much for tools. What about components? Contrary to the belief in some quarters, the valve is very much alive so far as the field service engineer is concerned – a fact that Philips seem to have overlooked in their latest toolcase. I bought one of their cases some years ago. It had special plastic clips to hold valves and was an excellent case, though after several years of heavy use the outer case fell apart. So I bought an executive briefcase made by Custom – they do a deep one, 19 × 14 × 16in., which is ideal – and glued the valve clips in the lid (see photo). The folder provided is useful for circuits, and the little pockets intended for pens can be used for trimmers, tweezers, etc. It's obviously not feasible to carry a full set of manuals, but the circuits for the popular chassis you're likely to meet should fit in the folder.

At the rear of the case I've made a small compartment about $2\frac{1}{2}$in. wide and the full width of the case. This takes all the small tools. In front of this I have four Raaco plastic boxes ($10\frac{1}{2}$ × 6 × $1\frac{3}{4}$in.) for components. These can be stacked two high. It's prudent to have a stout rubber band round each. There's still room for the multimeters I carry, the soldering iron and gun and one or two other items. A piece of plastic foam about $\frac{3}{4}$in. thick covers the lower compartment and doubles as a kneeling mat. As mentioned before, don't overstock with components. Throw the used ones in a box, and replenish daily.

In addition to making life a lot easier, the toolcase impresses the customer, giving him confidence in your technical ability.■

The Exorcism of Fred

Les Lawry-Johns

WHEN I heard all the shouting and cursing coming from the bathroom I had an uneasy feeling that something was wrong. Only that morning the gas fitter had been to repair the multipoint so that honey bunch could have her bath and splash around happily. Now it seemed that she wasn't splashing around, and it appeared that a bath was out of the question as the gas was again not flowing. It was all my fault of course.

I did my best. I took an electric kettle up and plugged it in for her so that she could splash around in the sink, but she still wasn't happy. So the next day I phoned the gas board and told them that as far as gas goes, it had gone again.

Another and much nicer chap came and said that the faulty unit couldn't be repaired and that he would bring a new one as soon as possible. The next day brought two messages from the gas board: one was a bill for the repair of the old unit, the other was a note to say that a new unit would be fitted in two days' time.

Smack on time the new unit arrived, and was fitted by the fitter who had brought his stereo cassette deck with him to be repaired. Apparently, all the time it was playing there was an intermittent crack from one speaker, accompanied by a distinct jump on the right-hand VU meter. The left did not appear to be affected.

It was a Marantz 1820 Mk II. Quite a nice job if you understand these things, but normally I'm a little shy and confess to a total ignorance of them. If he was good enough to get my honey bunny into hot water however, I was going to sort this thing out however much I suffered. And suffer I did.

Off screws, off cover. Identify the right-hand and left-hand amplifiers and concentrate on the right-hand one. Without a cassette in, but with the thing playing away like mad, there shouldn't have been much noise in the headphones nor any movement of the meters. Every now and again however there was this distinct click in the right-hand headphone and a small jump on the meter.

So I shorted the base and emitter of what appeared to be the final amplifier and the noise vanished. Good, we're making progress. Ignore the fact that a slight click could now be heard in the left-hand headphone, about every fifteen seconds.

Proceed down the right-hand channel to the input, shorting the base to emitter of each transistor in turn, and at no point did the click reappear on that side. It reappeared only when the amplifier was left working normally – and then far louder on the right-hand side. So we listened for the background hiss, and this too was louder on the right-hand side. When the two sides were equalised, the clicks sounded the same and both meters responded to them. I sat there encased in my headphones and pondered.

The regularity of the clicks suggested that the cause was nothing irregular. Therefore it was something building up a static charge due to regular movement.

"You're the only moving thing" I said to the cassette motor, prodding it with my meter and leaving it there. What a masterstroke! What genius resides here! Removing the prod and allowing fifteen seconds on my dad's old watch brought back the clicks. The cassette motor is cushioned on rubber grommets, and has no bond to earth. It has now. The gas man was awfully pleased. Then I gave him the bill.

Enter Mr. Slaughter

Mr. Slaughter's a jolly fellow. Must be something to do with his living. I don't mean the *fact* that he's living, I mean what he does for a living. He's a butcher of course. What a way to get rid of your inhibitions! Chop up a leg here or there. Nice piece of breast madam? – certainly. Slice, slice. Anyway, I helped Mr. Slaughter in with his Bush CTV1122 (Rank A823A chassis). "Picture's sort of faded. As though the entrails have been taken out, ha, ha." "O.K. Mr. Slaughter, call back this afternoon. I may have managed to stuff them back by then."

When Mr. Slaughter had departed I was alone again. As all geniuses who can earth the casing of a Marantz cassette motor must be. I would again try my diagnostic ability.

The picture certainly lacked entrails – we don't say guts in this magazine, we leave that sort of thing to *Wireless World*. Plenty of foreground but no background. Our diagnosis was immediate. Faulty SL901 demodulator/matrixing chip. Just to be sure, I clipped in the test panel. Lovely picture. "When the chips are down, you know who the men are" I muttered. With two deft sweeps of the desoldering braid the SL901 was free. Pop in the new one and Bob's your auntie.

In went the new chip and back went the panel, not forgetting to put the black plug back in the power unit.

When I switched on I noticed a flash from the surge-limiting thermistor, and resolved to change it before completing the job.

The picture was still the same and all my cheer departed. The sound was o.k. and the colour was there, so I made another guess. The luminance emitter-follower transistor – where was it? I grabbed the circuit and took off my glasses so that I could see it. There it was, 3VT3 (BC148). Coupled to the luminance delay line via that electrolytic ... that electrolytic (3C43). Then I remembered. I always do when I've wasted quite a bit of time.

The capacitor is of the type (you know the ones) that when frightened by the meter reads about 500kΩ and steady. The circuit said 6·5μF, the faulty one was 10μF, so I put in an 8μF type because one was looking at me out of the box. In it went (round the right way for a change) and harmony was restored – until I switched on and the surge-limiting thermistor flashed and fell to bits. Why didn't I change it the first time I noticed?

The Card Game

We labour for six days without complaint. Almost without complaint. On Sunday morning we tidy up a bit, sort out the books etc., and at twelve o'clock get ready for the big event of the week. At one o'clock the card game starts at "The Call Girl" which, if you remember, is a pub in Harper St. where Ernie presides over the taking of our hard earned cash.

All week long honey bunch and I are on the best of terms. Most of the time. But at one o'clock on Sundays we are bitter enemies, no quarter asked or given. She's Sean's partner, and I have either Mick or Dick depending upon who's helping Ernie behind the bar.

The game is whist, and therefore partners are not always on the best of terms, or let's say don't always see eye to eye, though I must say that honey bunch and Sean rarely fall out and are most polite to each other. This is in distinct contrast to my partner and I, who scream and shout abuse at each other at the slightest suggestion of one trumping the other's trick. Despite this we are usually handomely in the lead after a hard fought battle, and honey bunch has many theories as to why this should be, none of which holds water as far as I'm concerned.

If there's one topic I hate during all this it's TV sets, and if anyone broaches the subject to me at Sunday lunch time they usually get short shrift. When Sean was dealing this week however (he deals hearts as trumps) he started telling me about his TV set that had gone wrong the previous day. I didn't hear a word of it because I've got a lot of wax in the ear nearest to him. The fact that I didn't hear what he said upset honey bunch who immediately accued me of not taking any notice of what Sean was saying.

"I can't hear through this ear" I explained. I'd just about got the gist of it however. ITV keeps dropping out, but the other two channels are fine. "The grease in the tuner unit wants cleaning out" I said. This seemed to me a perfectly valid explanation, since the set was a Thorn 1500. Sean muttered something like the grease in his tuner being about as troublesome as the wax in my ear.

But we got back to playing cards, and Dick and I won the hand by two tricks. It was then Dick's turn to deal and he deals clubs. "My set's playing about as well. Keeps going green it does." His set was a Thorn 9000, which we'd sold him some four years earlier. I was busy collecting all my trumps and putting them in order when Sean stirred it up.

"He doesn't hear out of that there, but I can tell you what's wrong. You've got wax in your tuner unit."

I shot Sean a baleful look. "He hasn't got grease in his tuner, but you have and when I clean it out tomorrow the ITV will be as good as the other two, however daft that seems, and what's more I doubt whether you'll get one trick in this hand."

That concentrated everyone's attention on their cards wonderfully. Honey bunch whispered "I bet he's got a handfull of trumps."

"Too true I have" I sneered, and then realised that I'd heard her whisper very well. "I haven't any wax in this ear, so there."

A Ghost Story

I suppose that at this time of the year a ghost story's in order. This one I've known about for some time, so it's not a tale that someone has just made up. Maybe there's an explanation, but I can't see it.

Our local newsagent and his wife and family live in a house at the top of the road, adjacent to an old church that was pulled down some years ago, the site being grassed over and preserved. Some years ago they realised that some peculiar things were happening, like rings vanishing from the dressing table in the bedroom and appearing on top of the TV set. Silly things, but irritating when you put a thing down in one place and then find it somewhere else. Hardly a ghost however. Then one day on arriving home in the evening they found a quaint looking old man in a funny hat sitting in a chair in the lounge. When they came in he got up and walked through the wall (the people next door also see him passing through apparently). He didn't seem to harm anyone, so they accepted him as an occasional visitor and called him Fred.

They saw a lot of him after that, coming and going at odd times, and he seemed to have a liking for that particular chair. Their teenage daughter was not so keen however, since she swears that he laid on her bed one night and wouldn't get off for some considerable time, during which she was unable to move. They also have two sons who were well acquainted with Fred, and a black and white spaniel by the name of Toby who was scared stiff of him. On one occasion when Fred appeared and walked toward Toby, the poor dog became almost hysterical and backed up the stairs with every hair on his body standing on end. In short therefore everyone in the house had seen him.

When I heard about all this I was convinced that one of the younger members of the family was responsible for the manifestation, as young people often are without being aware of this peculiar ability. As they get older they seem to lose the ability, and many a good ghost has gone west merely because the children have grown up. In this case however the children were not particularly young, and the one most affected by Fred appeared to be the dog.

As I say all this was well established and caused little concern. Some time later however the family acquired another dog, this time a golden spaniel by the name of Copper. Now Copper is one of the most extraverted and joyous dogs I've ever known. Always chasing around and barking for the sheer fun of it.

Copper hadn't met Fred who popped in only from time to time. One evening however Fred appeared in the lounge just as Copper came hurtling through the front door and into the lounge. Copper saw Fred and made straight for him. Fred took one look at the barking dog and promptly vanished. He hasn't been seen since. Or so I'm told.

So now you know what to do if you want to exorcise a ghost. Any ideas about the different effects on the two dogs?

I Wish I Had Your Job

Les Lawry-Johns

YOU'VE noticed of course that once one horrific, heartbreaking job has been cleared up another immediately follows. Then, as though Satan himself was directing things, yet another comes along. That's how it's been recently.

"These things are sent to try us" said honey bunch consolingly.

"Try us indeed. What you mean is try me. It's me that's being tried and found wanting, and the chances are that someone up there doesn't like me and never will. I'm fed up with it all. Mix me an overdose and let me be free."

"How you do go on. Just because you're mucking up one job after another we all have to suffer. Now if you'd taken that panel out properly instead of wrenching it out like a maniac it wouldn't be cracked right across."

Fluctuating Picture

So saying she wandered off and left me trying to think up a suitably cutting reply, something I found difficult since I was still trying to work out why the picture on this Bush Model CTV1122 (A823A chassis), which had come in to have a new tripler fitted, was fluctuating so wildly. They had mentioned that the picture occasionally "jumped on changes of scene", and I'd said it was only a small thing that wouldn't take a minute once the new tripler was in . . .

I examined the picture carefully. On a bright scene, or when the contrast was advanced, some lines appeared horizontally, the picture fluctuated wildly in size, and there was evidence of a hum bar. A meter across the h.t. line showed a corresponding voltage fluctuation before the picture quickly settled down. I pointed an accusing finger at the thyristor, but noticed that it was new – as was the trigger diac. To be sure, I fitted a known good spare panel, but there was no difference.

With the hum bar in mind, I turned my attention to the h.t. smoothing and reservoir capacitors. Both had small bubbles at the end, so out they came. At the same time I noticed that there was some corrosion at the tags of the centre l.t. smoothing capacitor, and one tag fell off when it was touched. So out it came and we ended up with a shining new set of electrolytics. No difference, except that the hum bar, which hadn't been very evident anyway, now wasn't evident at all. But the picture still showed lines and fluctuated from time to time, particularly when the contrast was advanced.

Since the field scan seemed to be affected most, I replaced the right-hand side timebase panel – without much hope of success. It must be the new tripler then. It wasn't. Neither was it anything to do with the line output stage nor the convergence panel. I examined my head carefully in the mirror. Definitely greyer, and there was this kind of glazed look . . .

It must be a poor earth return. The term has a likely ring to it. Crocodile clips and leads all over the place, and whilst wasting all this time I noticed that a new tube had been fitted recently. This was the last place left to check. It just had to be here.

All the earthing connections seemed to be loose, as though whoever had fitted the tube had been so exhausted by the effort of securing it that they hadn't the strength to finish off the job. The thick sleeved strap really seemed to be the one that was slopping about, and when this and the other contacts were tightened we couldn't make the fault reappear. We still can't quite see how this could have been responsible for such a drastic h.t. voltage variation.

"Did you find out what was giving you so much trouble?"

"There was a screw loose."

"Quite common around here."

No wonder I hate women.

All that Glistens . . .

A familiar car drew up outside. It had drawn up only yesterday. The nice man with the 26in. Philips G8. We fitted a nice new line output transformer for him, and he'd paid in nice new fivers.

The 800mA fuse on the line timebase panel had failed again however. There were no shorts, and the output transistors appeared to be in order, but when we connected the meter across the fuseholder and switched on we got a reading of well over 1A, while the 47Ω anti-breathing resistor in the h.t. feed to the line output stage started to overheat. Pop went the fuse on the power supply panel.

Once more my hawk like eyes narrowed. Once more I couldn't see a bloody thing. But I was called upon to make a decision. The glistening new transformer was unsoldered and removed. A dull brown FAT 035 G8 replacement was fitted. The tripler was left disconnected, a new fuse was fitted over on the power supply panel, and the meter was linked across the fuseholder on the line scan panel. Switch on and a reading of some 400mA showed that the right decision had been made, difficult though it had been. Connect the tripler and the reading rose to about 500mA.

"Sorry sir, very sorry. Your new transformer had rather a short life."

"I hope this one fares a bit better."

"It will sir, and a happy new year. Mine's started off interestingly enough."

How fortunate that we keep a good stock of G8 line output transformers.

How prudent that we keep a good stock of . . . if there's a competitor, it must be the Rank T20 chassis. Having said that however I must add that I find the G8 the easiest set to work on. It's caused me few real problems.

Which Reminds Me

One that raised my eyebrows came in the other day however. It came in because the picture was over large, and because the customer was fed up with the service he'd been getting from a nation-wide group. The over large picture was due to low e.h.t., one of the line output transistors being short-circuit. We also found that the h.t. was 240V instead of 205V. Having replaced the short-circuit transistor, we wound the h.t. preset down and checked again. Still 240V. So we checked the preset in the over-voltage protection

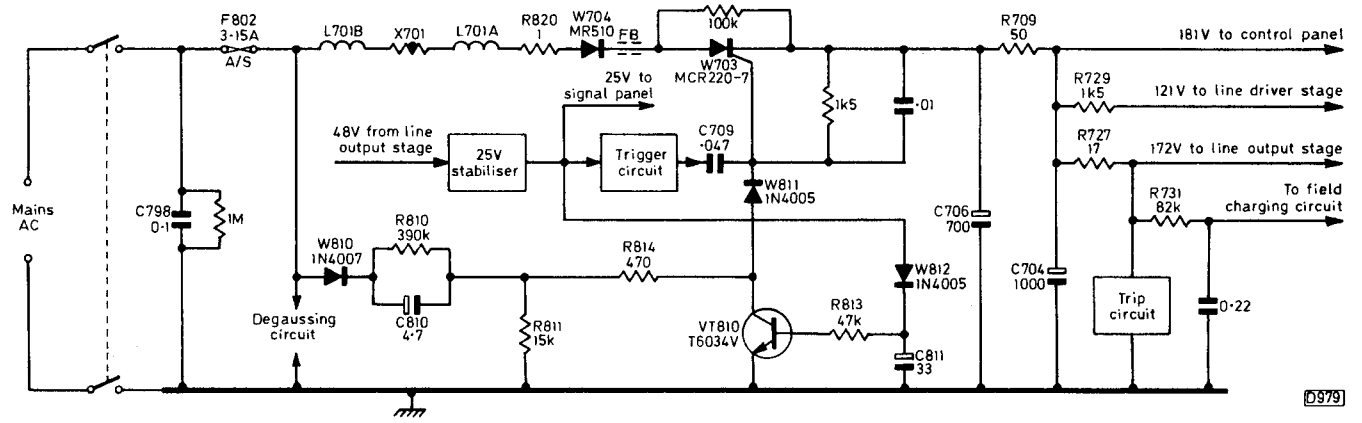


Fig. 1: Simplified circuit showing the power supply arrangements used in the Thorn 9800 chassis. Because the low-voltage supplies are derived from the line output stage, a start-up circuit is required. This consists of W810 and the associated components. When the set is first switched on, mains-derived gate pulses are fed to W703 via W810, C810, R814 and W811. Once the h.t. supplies have been established, the line output stage will come into operation, producing the 48V and stabilised 25V rails. The thyristor will then be triggered in the normal way. When the 25V supply appears, W812 charges C811 and VT810 switches on, shorting out the start-up circuit. Should the over-voltage trip operate, the h.t. and l.t. supplies will decay. W812 will be reverse biased and the time-constant of C811/R813 will hold VT810 on for a while. This prevents the thyristor being triggered until the h.t. supply has been discharged.

circuit. Adjusting this reduced the h.t. all right, but of course the picture was then fluctuating. This suggested that the thyristor was not well. It was new however, as was the BR100 trigger diac. This was presumably why the previous repairer had left the h.t. at 240V, with a steady picture, and had beat a hasty retreat.

I pondered. The protection circuit wasn't operating when the h.t. was high, presumably because it was not set up correctly, but was able to reduce the h.t. voltage when adjusted, the h.t. preset doing nothing at all. It seemed likely that something was wrong with the regulator action. R1368 (470k Ω), which is in series with the h.t. preset, and the feedback resistor R1372 (390k Ω) were both found to be out of tolerance – with R1368 really high. Replacing both resistors restored normal operation, a 205V stabilised h.t. supply and a happy customer.

The Thorn 9800 Chassis

We've sold quite a few Thorn 9800s – along with 9000s, 9600s and 8800s. While the 9600 is a larger-screen version of the 9000, with the Syclops system but with quite a lot of differences, the 9800 is a descendant of the 8000 series chassis, being a variant of the 8800. This means that it uses a thyristor regulated power supply with an over-voltage trip and, in addition, an inertia start-up circuit. The latter is required because of the subtle changes introduced with the 9800 chassis. Out went the mains transformer, all the low-voltage supplies in the set being obtained from the line output stage, which incidentally employs a diode-split line output transformer. So with only the h.t. supply mains derived, and the thyristor's trigger circuit powered from the scan-derived 48/25V rails, a start-up circuit (see Fig. 1) is necessary. All this is rather complicated and serves to

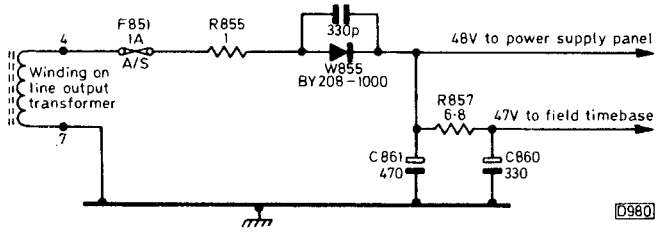


Fig. 2: 48/47V supply circuit, Thorn 9800 chassis.

explain why a simple soul like me gets confused for a little while . . . sometimes longer.

Anyway, the fault reported was intermittent field collapse and hissing, and like a loon I headed straight for the power supply panel, expecting to find a dry-joint in the supply to the field timebase – as you might with the 8000-8800 series. I removed the panel and checked it over thoroughly. Apart from one in another circuit, there were no suspect connections. So I replaced the panel and then found that there was no supply of any sort worth mentioning, except that the power supply was tripping slowly. The slow tick irritated me intensely, since we were now in another ball game and one that always confuses me. Old dogs don't easily learn new tricks.

A meter connected to the 50Ω h.t. filter resistor R709 confirmed that the h.t. supply was rising slowly to about 50V, then ticking back to zero. This meant that the start-up circuit at least was functioning. Just then my friend Geoff from Moon Lane popped in to say hello, and asked whether I was in trouble. I explained that the field collapse problem had resulted in me buggering about with the power supply panel, and that I was now in it up to my neck. He said he'd had the same trouble a little while ago and had done much the same thing before realising that the 47V field timebase supply comes from the line output stage. That cheered me up enormously, since now I had a slowly tripping supply and hadn't even started to clear the original faults.

The manual suggested that providing an external 24V supply would help. It didn't seem to make much difference however, so I lost my cool and decided to supply the set with some h.t. whether the set liked it or not. I grabbed a 150Ω, 17W resistor and slapped it straight across the thyristor – the thyristor is preceded by an h.t. diode (W704) which can do the rectifying bit. This started the set up with no trouble at all, and on removing the 150Ω resistor the set remained on, albeit with a small picture and low h.t. I then noticed that the set h.t. preset control appeared to be at minimum, and on turning it to about midway the h.t. voltage was correct and the picture full size. Switch off and check how the set behaves from cold. Switch on, hear the e.h.t., then find a bright line across the centre of the screen. At least the h.t. was correct.

So I decided to tackle the original problem of field collapse. We now know that the field timebase supply comes from the centre line output stage panel. This can't be

reached from below, so the set had to go off again. Release and slide out panel, then upend it. The 47/48V supply circuit is shown in Fig. 2, and what we discovered was that the 470 μF reservoir capacitor C861 was loose in its solder while the filter resistor R857 (6·8 Ω) was dry-jointed. The dry-joint on R857 would explain the field collapse of course, but would the loose reservoir capacitor explain the tripping? All I can report is that no further trouble of this sort has been experienced, but a few minutes after sorting out these connections the hissing initially mentioned put in an appearance. This turned out to be due to a kink in the e.h.t. cable as it left the top of the line output transformer socket. A new cable with a long-reach nipple was fitted and this trouble was over.

The fact that there was intermitent colour after an hour's use meant that the set came back in again for an i.c. change, but no one had mentioned that so how was I to know?

"I wish I had your job" said Dick as he dealt out the cards. "You never seem to have any worries."

I didn't hear him properly because of the wax in my ears.

Test Report: The NLS LM353 Digital Multimeter

Eugene Trundle

THERE'S a wide range of digital multimeters on the market at present. Some still use an LED display, but these are now in the minority. The more recent LCD system has many advantages (unless you're working in the dark!), mainly the lower battery consumption. From the many meters available, we chose the NLS manufactured LM353. It's about the smallest DMM we've seen, and is a good example of the current trend towards the miniaturisation of test gear. The instrument is one of a range of several DMMs produced by this manufacturer. They share a common case size, offer a choice of LED or LCD displays, and vary in price from £69 to £195 ex VAT.

The LM353 is about the size of a PP9 radio battery and, being housed in a plastic case, can very often be sat inside the equipment under test. It's a $3\frac{1}{2}$ digit type, which means that "full-scale deflection" is 1·999 and decades thereof. Since a digital display cannot go backwards or "off the end", polarity and overload indicators are required. These take the form of a + or − sign before the readout, and a steady 1 display in the event of overloading. There are a.c. and d.c. voltage and current ranges – four, from 2V to 1kV and 2mA to 1A. The resistance ranges are from 200 Ω to 10M Ω. Power is provided by four AAA size cells, the battery life being quoted as 100 hours. Inside, the instrument consists of four i.c.s and a fair number of discrete components, arranged on three small, parallel-mounted glassfibre boards.

On the Bench

During the two weeks I had the meter for test, it was being constantly used for TV servicing. I found that the calibration accuracy was within specification on all ranges, and that the a.c. ranges were average-sensing/r.m.s. calibrated for a sinewave input, as is usual with this type of instrument. On the resistance ranges, I found that the kilohms range had the ability to forward bias a semiconductor device (test voltage 2V), whereas the kΩ/10 range, with applied voltage of 200mV, was not sufficient to switch on a semiconductor junction. This has the advantage that many components mounted around a silicon semiconductor device can be checked in situ – a useful point, and one which may not be immediately apparent. The current ranges require the meter to drop 1V at f.s.d. on all ranges: this seems rather a lot!

I was not so happy with the LM353 mechanically. The front panel is made of wafer thin plastic material which looks vulnerable to damage, and I'm wary of the battery changing procedure. This involves removing the whole outer case, exposing the delicate circuit boards etc. Finally, the front panel printing around the range switch is spaced in such a way that the click stops of the switch get "out of phase" with the panel legend. In the extreme case, on the direct current range, the knob tends to point more to "AC mA" than "DC mA".

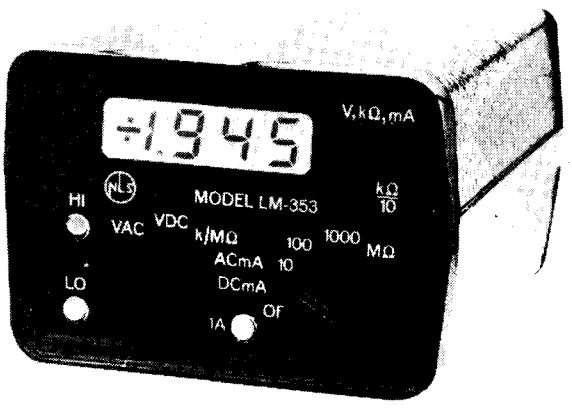
On the credit side, the main case and back cover are made of a tough, flexible material, and a useful multiposition prop/hook/handle is provided – I slipped some sleeving over this during the time that I had the meter for test, so that the instrument could be laid in a working TV set without the risk of the metal prop causing fireworks.

Conclusion

If your requirement is for a DMM of minimum size for general purpose use, you won't find one smaller than this! It works well, but is certainly not under priced at £75 plus VAT.

One of my TV servicing colleagues long years ago regularly used to carry out his field servicing on a company Lambretta motor scooter. If the current depression bites much deeper, maybe we shall all have to return to this economic but hazardous mode of transport. Just right for the super technician who never has to bring a TV set back to the workshop (does anyone know any?). If this comes to pass, test equipment such as this meter and the baby oscilloscope recently reviewed will be much in demand!

The LM353 is available from Lawtronics Ltd., 139 High Street, Edenbridge, Kent TN8 5AX.



The NLS LM353 "baby" digital multimeter.

The Shooting of Sam Magrew

Les Lawry-Johns

HE was a funny sort of fellow. Sort of round, if you know what I mean – five foot tall, five foot wide and five foot deep, with a face proclaiming that the Lord had not been too generous when dishing out the intelligence quota. He had to screw up his watery blue eyes to protect them from the smoke that forever issued from the fag that stuck out of his mouth – it was there the whole time he spoke, which he did incessantly while never really saying anything. He probably kept it there whilst eating as well. I vaguely recognised him as a labourer for a local builder, which perhaps explains why the local pub keeps falling to pieces.

Anyway, he came into the shop one morning, talking before he even got through the door and expecting me to understand exactly what he meant though I'd heard only the half of it. I can't possibly record his exact words, only the gist of it.

Apparently his old TV had finally given up the ghost and had been dispatched to the graveyard. As a replacement, his sister had given him a "new" Bush set which had gone wrong a couple of years previously and had been stored in her loft. He would like it got going again. No, he couldn't bring it in as he didn't have a car. And he'd like it done today otherwise his old mum, who was a cripple, wouldn't have anything to watch. Which is why I nipped up there to see if I could sort things out.

It was a hybrid monochrome set – A774 chassis. Its on/off switch was faulty for a start, and as it had been stored for a couple of years I thought it would be prudent to take it back to the shop. As I prepared to put it in the car, he cheered me up by telling me that I'd been the last one to repair it, and that although his sister thought I was all right her husband hadn't liked me. I thanked him for this interesting bit of information and departed, promising to return before evening so that the old girl could see the night's programmes. Before I left he shouted out that he wanted his name put on the set, because he didn't want it changed over for one that was no good.

"Magrew. Sam Magrew. Anyone round here will tell you." I drove off wishing I hadn't got involved to start with. I couldn't really spare the time away from the shop, and I had this funny feeling . . .

There were several other jobs that had to be done before I could attend to Sam's set, but when I got to it I fitted a new volume control-on/off switch and checked for any obvious shorts. Switch on and the valves lit up, but as soon as the line timebase got going the e.h.t. rectifier's heater winding on the output transformer started arcing. This wasn't surprising, in view of the fact that it had been stored. So I pondered upon the wisdom of either fitting a new transformer or simply replacing the heater winding and keeping my fingers crossed. Totting up the cost of a new transformer, plus the on/off switch etc., I came to the conclusion that the total would be no mean factor to Sam, who'd had the set given to him anyway. So out came the DY802's holder, and some e.h.t. cable in sleeving provided the winding. I knew this was a mistake, but like a fool kept on. The e.h.t. now came on nicely, and there was good sound. But sync was nowhere in sight. The sync separator transistor is tucked away on the left centre, near the vertical strut. It proved to be open-circuit. On replacing this the picture locked and looked good. So I stuck the set in the car and nipped it back smartly.

"Fifteen quid" bawled Sam, "I could have got a new one for that." The old girl tutted in agreement. Sam pulled out a wad of tenners and fivers and peeled off the fifteen.

"I hope it ain't going to give no more trouble after all this."

I began to loose my cool. "If the set's been stored in the loft for a couple of years, I'm responsible only for what I've just done, not the rest of the bloody thing."

Another Visit

Next morning Sam reappeared. "We saw the telly for just four hours, then it went off again. My mum's not very pleased I can tell you."

So we popped up and found that the line output transformer had given up the struggle. I put a new one in, with a stick rectifier, and carefully checked the drive and operating conditions, shutting my ears to the uncomplimentary conversation that was going on in the background about my abilities as a repairer of tellys. I'd intended to waive the charge on the transformer for the sake of customer relations, but as I could hear that these were already at a low ebb I cheered Sam up by asking for another tenner. This wouldn't put the balance right, but would help a bit. There was immediate uproar, and I think he said something about going to the race relations. This seemed a bit queer, but I eventually got out and beat a hasty retreat.

The Final Visit

You'll never guess who turned up next morning. Hard things were said. Suitably translated, the gist of his comments were to the effect that when he'd paid through the nose for a job he expected it to have been done, not half done. "What about the pub that keeps falling to pieces" I asked? "That's nothing to do with me, I only mix the cement."

So up we went again, and I was shocked to find that the new transformer had a short between windings, as a result of which the smoothing resistor lit up like a firebar. I told him I'd take it down to the shop to check it thoroughly, but he didn't listen because he was moaning about the money he'd already spent. So I counted out the exact sum he'd paid and put it on the table. Like a flash he grabbed it.

"You had the set given to you, and now you've grabbed that you haven't paid a bean. The only looser around here is me." That was my swan-song.

"Leave the set alone" he said unnecessarily. "I'll get Dave around the corner to fix it. He'll do it in no time and won't charge either."

On leaving, I felt I'd done something wrong somewhere. I've shortened the story so as not to bore you – in fact two new line output transformers had had to be fitted, and both had shorted to earth through the windings after some five hours' use. The line drive waveform appeared to be perfectly correct.

It was probably all my fault, but Sam's attitude was less than constructive so it was possibly six of one and half a dozen of the other. If you happen to meet a Bush set with an A774 chassis and a new line output transformer with a short, be careful.

I had a dream that night. Sam Magrew was at the bar

telling everyone that Long John Lawry was a bum. As I entered through the swing doors, Sam went for his gun and I went for mine . . .

It Never Rains

After that awkward epic, we just had to have another. Nothing complicated, just a Bush colour set fitted with the A823 chassis. No field scan after working normally for a few minutes. So we checked the vertical scan balance control 6RV2 and resoldered the pegs of the pincushion correction phase coil 6L20. No trouble at all, no more field collapse. Run the set for twenty minutes or so, then await collection.

Half an hour later there was a phone call to say that the colour had gone. Back it came. Change decoder panel: still no colour. Change i.f. panel: colour restored. Attack chroma amplifier and change little round transistors, fitting better known ones. Lovely colour. Check for thirty minutes. No loss of colour, no field collapse.

Next day there was a phone call to say that there was now no sound or raster and would I call as they thought that carting the set around was having a bad effect on it . . . So off I went. Blown l.t. fuse due to the BY164 l.t. rectifier being short-circuit. Fit more manly BY225 bridge and new fuse. Sound o.k., picture o.k., colour o.k. Would I mind if they gave the set a few days' trial before popping the money in?

Colour Faults

Three Thorn colour sets (3500 chassis) appeared in rapid succession. All with colour faults that may be of interest.

The first gave a nice monochrome display, but when the colour control was turned up only blue and green were in evidence. This ruled out a good 80 per cent of the decoder circuitry, so we settled down to check the R – Y channel, from the bridge demodulator onwards. Our first suspect was the small electrolytic which couples the signal to the base of the R – Y preamplifier transistor on the video panel. This turned out to be all right however, so we moved back to the decoder panel. The filter choke L304 between the bridge and the output connection was open-circuit. Repair the choke and full colour is restored.

Feeling pleased about this quick one, we turned to the next. No colour. Check for presence of gating/blanking pulse from line output stage at 12/9. Present. Check at other side of pulse coupling resistor R351. Pulse still there. Check presence of chroma signal from i.f. panel at 12/4. Present and correct. Check for presence of colour turn-on voltage at base of chrominance amplifier transistor VT309. Nothing – there should be 17V at TP2. Check back through the circuit and find that the emitter-follower transistor VT305 is open-circuit, preventing the 4·43MHz reference signal going any place. Replace VT305. Nice colour. Another quicky! Could our luck last? No it couldn't.

The next one was a bitch. It needn't have been, since we'd had the same thing a couple of years previously. But suffering from senile decay as I am, I can never remember these things until I've spent a lot of time rediscovering them. So round and round the decoder we went, looking for the cause of the loss of colour. The basic problem was that the ident signal was missing. Think carefully about the ident stage. The 330Ω emitter resistor is decoupled by an 0·22μF electrolytic. Maybe this had dried up, killing the ident signal through negative feedback action? Bridging it seemed to restore everything to normal, but a replacement failed to make any difference. Tap the stage and the colour came back. Turn the set back upright and the colour went. Then it dawned on me. Removing the 7·8kHz coil's can revealed a sliver of solder which had obviously fallen into it during the course of a previous line timebase repair. Just as in the case two or three years back.

Why my brilliant, retentive memory keeps failing me like this I don't know. Honey Bunney says it's all these sex books her cousin brings in for me. He has lots of technical books given to him as surplus by someone who collects them from newsagents, and scattered amongst them are these naughty books I find of some small interest. But I don't really think they cause loss of memory.

No Field Scan

A Philips colour set (G8 chassis) was a little too large for its owner to bring in, so we had to pay it a call. The fault reported was no field scan, and as this can be a little awkward at times we took a spare timebase panel with us. This was as well, since on checking the voltages around the two BD131 output transistors everything seemed to be about right. So we fitted the spare panel, then spent some time on other little jobs that needed sorting out – grey scale, convergence, etc. Having satisfied the lady of the house that the set was now in 100 per cent condition (even though the original complaint had simply been about the field collapse), we took the faulty panel and ourselves back to the shop.

On the bench, the panel was checked. The transistors and the BRY56 s.c.s. all appeared to be in order, but the field charging capacitors C4451 and C4452 were virtually open-circuit. Replacing these electrolytics and applying about 30V to the supply connections F1 and F2 proved that the panel was now working – because of the buzz from the loudspeaker of the signal tracer – but as we didn't have a G8 around we couldn't tell exactly how well the panel was performing. When one did come in, for a new line output transformer, we took the opportunity to check the panel. The height and linearity were not up to standard, and although the BD131 output transistors read all right on a meter new ones had to be fitted to restore some range to the operation of the presets.

Dog Attacks Vicar

Ben is fairly large as rough coated collies go. Placid too, as far as people are concerned. When it comes to territory and other dogs however, it's a different story. His pet hate is a black dog which comes past with its owner and marks his patch as it were. If he could get out when that dog passes there'd be an awful reckoning. The problem now is that Ben's dislike of that dog appears to have turned into a pathological hatred for all things black. For example, there's a lady who passes with a black shopping basket on wheels. This makes Ben go berserk.

Well the other Sunday morning we'd just returned from our walk and I'd slipped Ben's chain off prior to opening the door when I caught sight of the vicar toddling down the road, supported in the main by his rolled umbrella.

"Morning vicar." I'd hardly got the words out when Ben rushed straight at him, with every hair standing on end. Not a pretty sight. Ben's teeth fastened on the black umbrella, and the vicar was robbed of his support. Fortunately Ben realised his mistake at once, and looked rather sheepish even before I cuffed him round the ear. But the vicar was going round in circles trying to stay on an even keel. I tried to help, with the result that we both gyrated around a couple of times. Profuse apologies were offered and accepted. "It's your umbrella" I explained, "it's black you see."

Needless to say, Ben's been in the dog house ever since.

It Started to Say Something . . .

Les Lawry-Johns

I WAS busy sitting at the typewriter wondering what on earth to write about when this young lady came in carrying a small colour portable. A corker and no doubt about it: a vision of loveliness with that elusive quality called style. As she approached I suddenly remembered what life was all about. None of that twaddle about what we are here for and the hidden meaning of life.

"I wonder if you can help me?" she asked quite unnecessarily. "This is our second set, but when we switch it on it starts to say something then stops. We switch it off and on and it just about comes out with another word then packs up again. I know that sounds silly, but I'd be very grateful if you could get it to say a sentence at least." Plus a sense of humour . . . "It's a Philips. K9 I think."

I looked at her carefully. It was a KT2 actually, which is not far removed from the current KT3. Not at all like a robot dog. All good fun, so I grabbed the pad.

"Could I have the name, address and telephone number please?"

"My name's Knell. E. Knell." The pen nearly fell from my hand. Could this be the legendary . . . Had she come all these thousands of miles to test me? But I kept my cool.

"Could you call back in a couple of hours, please. We'll have it done to your complete satisfaction er . . . well, done. Never fear . . ."

"All right then. I'll get my husband to pop in later to collect it."

After she'd gone I pulled myself together. What a fool I'd been. What rot to think . . . Anyway, I'd rather rashly promised to have it ready in a couple of hours, talking normally and hopefully showing a picture as well. So off came the back cover. Plug in aerial and select BBC-1. Switch on. It came on, said "well", then lapsed into silence. Obviously the protection circuit was protecting something or other against something or other . . .

So I turned it on its face and switched it on again, noticing this time that with the volume turned down so that it couldn't speak there was a hiss and a subdued crack from the top of the cabinet around the e.h.t. connector. Switch off, remove e.h.t. connector and suspend it well clear, then switch on again. This time it continued to function, even to talk when the volume control was turned up.

There was no deterioration on the e.h.t. cap, and thorough cleaning of the top of the tube (very little clearance) showed no muck that might have promoted a discharge. So we put the cap back and tried again. The set remained on, but a hiss could be heard and with the lights out a faint blue haze could be seen from the top of the tube to the Rimband. Off came the connector again, and we renewed our efforts around said area with silicone. This time there was hardly any hiss when we refitted the connector, and what there was stopped when we reduced the chopper-regulated h.t. supply from 131V to just under 130V with R405. We now had a set that talked and produced a splendid picture as well.

You won't believe this, but an hour or so later a little grey-faced man crept into the shop and enquired as to whether his set was ready.

"What name sir?"

"Knell. My wife brought it in earlier."

So there you are. Here am I, a fine strapping figure of a man bursting with health, and here is he, an empty shell of a man, sapped of his manhood, old before his time. Lucky man.

Enter Jacko

You may recall Jacko. I have great difficulty keeping him away from Honey Bunch because he always thinks it's New Year's Eve, even in the middle of May, and Honey Bunch thinks it's great fun to hop around keeping at arm's length but always manages to get caught before Jacko gets puffed out. Anyway Jacko turned up with his Pye 697 (hybrid colour chassis) complaining that all he could get was a white line.

"Good" I said, "it shows what perfect convergence you have."

"Let's not talk about me" said Jacko, "it's the set I'm on about." Which spoilt my little joke.

Now field collapse on a Pye hybrid colour set doesn't necessarily mean that the field timebase has ceased to function, i.e. the trouble need not be on the field timebase subpanel at all but in the long interconnections via which the supplies and the field drive come and go. Our first step was to ensure that the positive and negative 20V supplies were present at the output transistors. Yes. So we connected an audio signal tracer to the field output tag D in order to hear the field buzz. Loud and clear. The separate 20V supply to the height control is not important in cases of field collapse incidentally, since if it's absent – as it often is when the zener diode D52 on the main panel goes short-circuit – the effect will be lack of height rather than complete loss of scan. Complete collapse more often means an open-circuit somewhere in the long path from output tag D to chassis. This embraces many connections, tracks and leads.

Since there was a nice healthy buzz at tag D, we followed the green lead up to the top right edge connector on the power board, then down and across to the side edge connector. This is fairly easy if you know these sets, but is a bit tricky for those who don't because of the jump leads on the component side of the board – these are not marked on the print side. The circuit is then from the side edge connector to the scan coils, back to the edge connector and up to the convergence panel edge connector, with a link from here to the shift control on the power board. All this gives plenty of scope for poor contacts or hair cracks in the print runs.

By the time we'd proved the continuity to and from the scan coils the scan had opened up and no amount of pulling or pushing, tapping or bending would make it collapse again.

Whilst I was thus engaged, Jacko informed me that two (of the six) buttons were unusable. I told him he still had four, but he took the view that if two were gone the others would not be far behind. So out came the tuner head or selector unit (or whatever you like to call it), and we settled down to fit the replacement which had been up on the shelf for some time, together with ten million other bits and pieces which we order just in case they might be needed

(this is the reason for our destitution, and why H.B. and I have great difficulty in getting our ends to meet). Fit selector unit and switch on to align buttons.

There was a white line across the screen of course.

"We haven't got very far, have we?" commented Jacko.

I decided on another line of attack, since the first effort didn't seem to have been very rewarding. Switch the set off and make continuity checks from tag D through to the edge connectors, through the scan coils, then up to the convergence panel. Here my eyes crossed and I got mixed up a bit, but the reading down to the slider of the shift control seemed pretty low. The field coupling capacitor C455 on the convergence panel looked all right and anyway doesn't give trouble. All in all then a pretty fruitless exercise.

I made an unkind comment about the parentage of the Pye 697 range in general, and Jacko reminded me that I'd recommended and sold him the set in the first place. So we switched it on again and of course there was a full scan. It was Jacko's turn to query the set's parentage.

By now I'd convinced myself that on this occasion the trouble was not to do with the print or connections on the power board, and that as the field coils are in parallel the most likely suspect was the convergence panel. Further checks here revealed that the slider of the field R/G symmetry control RV40, which is in series with the scan coils, was dry-jointed. When this was made good harmony was restored all round.

"Took you a long time" said Jacko unkindly.

"That's true" said Honey Bunch, appearing briefly on the scene. "Most things seem to take him longer lately." So saying she vanished as quickly as she'd come.

"That'll cost you fifteen quid" I snarled at Jacko. "Pay up and clear off."

"You blokes must be making a fortune. I'll do it myself next time." Exit Jacko.

Interlude

Enter small boy.

"Have you any plugs mister?"

"Lots son."

"Stick 'em up your socket then!"

Bring back the stocks I say.

Knowing One's Job . . .

Les Lawry-Johns

EACH day that passes convinces me more that I don't know my job and never will. The fact that we successfully service thousands of sets is pure luck, backed by a little knowledge of some basic facts and polished by our experience gained over the years. Look at what happened yesterday for example.

A chappie, with some help, brought in a large Baird console that had a Thorn 3500 chassis lurking somewhere within. "Smoke" he said. "Lots of grey smoke every time we switch on." This to me meant that the fault was not a serious one, since there was not enough current passing to operate the trip – assuming that the trip was intact, and that it hadn't been shunted with 30A fuse wire. So I took a look inside and was surprised to find a strange small panel lying on the bottom left video board, connected by wires to the convergence assembly. It consisted of a couple of coils on magnets, with a knob for adjustment. Realisation burst upon me that it was the blue radial convergence assembly, snapped off the main block – probably by a heavy hand.

"The smoke comes from up here" he said, indicating the top right line timebase and beam limiter department.

"How long since this bit was snapped off?" I enquired.

"Oh that's not important: it was like that when I got the set a couple of years ago."

"That's not possible" I said with authority. "You just couldn't watch the picture with that off."

I removed the line timebase panel however, and found that C514 (4·7μF), which decouples the h.t. supply on the panel, was looking decidedly distressed. So I replaced it, refitted the panel, and switched on: first to prove that the smoke no longer issued and that the set worked, and secondly to show that you just can't do without blue convergence.

The picture took some time to appear, due to the age of the tube, but when it did become watchable (just about) it had only slight misconvergence. No doubt if the blue gun had been up to scratch the misconvergence would have been more noticeable, but there we were and I couldn't argue.

"That'll do me Lawry, at least until I start work and can afford one of those things you say I need." And off he went, after I'd secured the loose convergence assembly to prevent it shorting anything out. I was afraid to try fixing it back into its approximate position you see, because it might have messed up the convergence . . . Who needs blue correction anyway?

Another Failure

After this queer one, another one just had to follow. It was a Bush set, fitted with the Z718 chassis. I'd recently replaced the e.h.t. stick, as the original one had been causing the set to trip. So naturally the owner brought it back saying that the new stick was defective as the set was still tripping. It continued to do this with the stick disconnected, so even the owner had to admit that it must be something else. But what?

Tests proved that the line oscillator was working, and that line drive was reaching the output stage. To my befuddled mind it seemed likely that if the line output transistors were o.k., the line output transformer had probably taken exception to the load presented to it by the faulty stick, but I was loath to accept this diagnosis, mainly because I didn't have a transformer in stock. If it had been the T20 chassis, I'd have fitted a new line output transformer without hesitation, but the Z718 chassis is a different proposition altogether in this respect.

So I checked the line output transistors and found slight leakage in both. Two new ones went in and made no difference at all. "I must have the set today, because I'm going abroad on Monday and I must leave it working for the family." More frantic checks, all to no avail.

"I think it's the line output transformer" I confessed, "but I'm not sure. Nip it up to Geoff in Moon Lane and see what he and Eddy think. Two heads are better than one, and they probably have a transformer they can fit today." So off he went, leaving me with a severe dose of lost confidence, something that always makes me mean to the cat.

Some time later Geoff phoned to say that it hadn't been the transformer, and that Eddy had met this one before. After some preliminary checking, he'd diagnosed a faulty potentiometer – the NS pincushion phase control 5RV2. Later I had a look at the circuit. The defective potentiometer was presumably loading the field output stage, and as this obtains its 32V supply from the line output stage there would be an excessive load here as well.

Every One's a Killer

"Before you go" Geoff continued, "there's a little story you might like to hear." Apparently an engineer friend of his had been attempting to deliver a set to a customer, but couldn't get in through the front gate because of the ferocious dog that was barring his way, barking its head off.

The lady of the house looked out of the window and gave him instructions. "Kick his balls and he'll be friendly" – meaning the small balls it played with in the garden of course.

"If you'll turn him round I will" bawled the frustrated engineer.

"You horrid man. I'll report you for this."

Thank you Geoff. Every one's a killer. "You haven't heard anything yet" continued Geoff, warming to his task. "You remember Sam Magrew whom you described with such loving detail in the April *Television*?" As if I could forget him.

"He's on our back now. Came in for the cheapest colour set we could offer him, which also turned out to be the heaviest, a Thorn 3000 with sliding doors and all mod cons. Bloody great thing. Delivered it to his house and left it working fine. Next day he came in to say the set wasn't right and what were we going to do about it? Went up there and found that his crippled old mum had lugged it round to the other side of the room and mucked about with the aerial plug etc.

So we put that right and left it working again. We've been up there half a dozen times since to sort it out. She (or is it he?) can't leave it alone for more than a couple of hours.

I wish we'd never set eyes on him."

"What a shame Geoff" I tittered. "If there's anything I can do to help, like pushing him off the end of the pier, just let me know."

No on/off

A common complaint in recent years is that "the on/off isn't working." This is the customer's complaint, or rather statement, based on the fact that when they switch on nothing happens. Once in a while, usually after a lengthy explanation has been given as to why the switch need not be at fault, it turns out that they are right and the customer looks at you pityingly and says "what else could it have been?"

In the majority of cases however they're wrong and you could be on to a merry chase, especially if the fault is intermittent and the set comes on when you are about to make a key measurement that would solve the problem. The Philips G11 chassis is a particularly apt example: the upper right line output board can cunningly conceal dry-joints that contact at the slightest vibration. How you tackle this sort of thing is a matter for personal preference: resoldering every joint on the board may seem silly and time wasting, but it's often the only long term remedy if call-backs are to be avoided.

A Tedious G9

A recent time waster was a Philips set fitted with the G9 chassis. It turned out to have two intermittent faults, one producing the "dead set" symptom and the other an audible tripping as the h.t. line rose to 125V and then collapsed to zero, rising and collapsing cyclically. The faults would then clear and the set would behave impeccably for the rest of the day. We eventually managed to make some brief measurements at one or two points on the power supply panel, and discovered 10V across a 7·5V zener diode. When we replaced the diode the faults seemed to clear, but on switching on next day the h.t. was haywire again with a narrow, fluctuating picture.

We spent much time on the power supply panel, since the fault would clear for long periods. Whilst making a couple of adjustments on the line scan panel however we accidentally found that the fault could be provoked by applying pressure around the centre electrolytic C138 (2,200μF), which decouples the emitter of the line output transistor and acts as a reservoir for the 45V supply obtained from the EW diode modulator. Thinking that we were on to a dry-joint, much time was spent in the happy pursuit of resoldering, to no end of course. We then did what we should have done initially: we removed C138 and found that its end tags had deteriorated. A new electrolytic restored reliable operation, once the beam limiter had been set up correctly.

Enter the Flower Seller

A gypsy lady then came in and offered either to sell me some flowers or tell me my fortune. She seemed remarkably like the fortune teller I'd encountered at the seaside on that rainy summer day all those years ago – the one who warned me about the blue tants in Bob's TV set twenty years later. Not a person to be trifled with, even though it had cost me two and sixpence at the time. Seeing that I wasn't going to buy any flowers, she gave me a sample of her psychic power.

"You're not appreciated" she said. "People take you for granted and don't reward you enough for what you do."

"That's true" I agreed immediately. "Television sets cost no more now than they did ten years ago, so people don't want to pay any more for the repair than they did then, but everything else has gone up ten times. That's why I'm poor while everybody else is getting richer."

"You'd be better off emptying dustbins" she sympathized. "You need one of my lucky charms, then you'll be able to get away with charging more."

"Our dustbins aren't emptied" I protested. "We have to put our rubbish in these black plastic bags which they throw into the back of a big lorry thing with a big screw that goes round and chews everything up, and the dustmen tell me that if I don't give them a bigger tip this Christmas they'll throw me in and I'll be screwed."

"You'll get screwed if you don't stop talking rubbish and get on with some work" said Honey Bunch, trotting down stairs. "Oh what lovely flowers! Can I have some?"

So she and the flower seller lady engaged in some hard bargaining, whilst I was left out in the cold as usual without finding out whether red tants are any more reliable than blue ones.

SERVICE NOTES FROM PHILIPS

G11 chassis: Due to spreads in the characteristics of the TDA2591Q line oscillator/sync separator i.c., line jitter can be experienced. To overcome this problem, a 27kΩ resistor has been added in parallel with C2029 (0·1μF).

In models with full infra-red remote control, the SAA5000 i.c. (IC3606) used in the hand-held remote control unit has been superseded by the SAA5000A i.c., which has a lower power consumption. Along with this change, the values of R3601-5 and R3609 have been increased from 33kΩ to 100kΩ.

KT3 chassis: In sets that include teletext facilities, the value of C2160 in the i.f. module is 33pF – it's 120pF in non-teletext sets. A few cases of poor data capture have been reported due to C2160 not being of the correct value.

K30 chassis: To prevent power supply shut down when tuning, the value of R7322 on the U11 supply drive/control panel has been reduced from 3·9kΩ to 2·2kΩ.

To increase the field flyback blanking period and prevent the vertical interval test signals causing interference at the top of the screen, a 15pF ceramic plate capacitor has been added between the collector and emitter of transistor T1535, mounted on the print side of the panel.

TX chassis: On some sets a light vertical line may be present near the left-hand edge of the screen, more noticeable on dark scenes. The following modification should clear the trouble. Add a BY207 diode and a 10kΩ, $\frac{1}{4}$W resistor in series between the anode of the 95V rectifier diode D453 and the emitter of the video output transistor TS560. The anode of the added diode is connected to the anode of D453, i.e. the junction of R450/D453. Cover the diode and resistor with PVC sleeving, and connect a 7in. (18cm) length of wire to the free end of the resistor. The wire is taken to the video transistor: position the components in the sleeving along the near edge of the panel, away from the line output transformer, and keep the length of wire away from any components that generate heat.

The End is Nigh

Les Lawry-Johns

I can't help feeling that the end is near. For years I've been kidding people that I know my job and have some sort of crystal ball I look into and immediately know what's wrong with every piece of equipment that comes in, be it a telly, radio, cassette, record deck, depth sounder, automatic pilot, diathermy unit (flesh cutter with a high-frequency probe I think) or what have you. Now I don't seem to be able to get anything right, be it a bread and butter TV set or the decoder in the Mitsubishi CT200. As for these switch-mode power supplies that shut down at the drop of a hat, what's wrong with fuses for heaven's sake? They're not wholly electronic I suppose.

Say for example that an e.h.t. tripler plays up. Once upon a time a fuse in the supply would fail. So you unhooked the tripler, checked the h.t. current with a meter to ensure that it was normal, fitted a new tripler and went to bed. Now when a tripler plays up the power supply senses the overload, shuts down, starts up and shuts down a couple of times and then lapses into sullen silence. In the meantime this huffing and puffing deals the bloody line output transformer a mortal blow, and if it continues to function for the present it'll certainly fail next week, with more huffing and puffing from the power supply. They even shut down when there's nothing wrong, adding chaos to the mayhem.

No, it's all too much for me. Human Rights have been a great benefit to suffering humanity. We never get a second thought. Even when you're having a quiet kip on a Bank Holiday afternoon, the editor rings up and says "don't just sit there, do something". (May Day wasn't intended for the rich owners of department stores – one department for the customers, one for the stock and another for the staff, including cat and dog – editor.)

So I'm busy carving my headstone. I don't trust these stonemasons. So far I've managed to chip out:

Here lies the body of LLJ,
He twisted and turned but couldn't get away.

The Thorn 8500

All this is leading up to the saga (amongst others) of Mr. Piddlewell and his Thorn 8500 colour set. He plonked it down and said it didn't go except for a faint buzz when it was first switched on. "It must be the on-off switch" he informed me. "Rubbish" I replied, "if it was the on-off switch it wouldn't even buzz. Hang on and I'll take a quick look."

With the back off, we could clearly hear the degaussing coils doing their bit when we switched on. There was precious little else however. Unfortunately it wasn't an 8000A, which has a 12Ω dropper instead of a mains input choke. That would have been easy, as the fault would probably have simply been an open-circuit dropper. Anyway, in addition to the choke there's a thermistor (usually), so a quick check was made to ensure that it was intact. We next moved the probe to the thyristor's anode – and the set immediately sprang to life, frightening Mr. Piddlewell out of his senses. He jumped back like a scalded cat. "Don't do that when I'm not ready!"

"Sorry" I said. "I didn't know the prod was going to prod it into action. Let's try it again." So we switched off, waited a while, then switched on again. Nothing happened apart from the buzz. "We've got to creep up on it" I told Mr. Piddlewell.

"You creep up on it" he said. "I'm standing well back this time."

So we tried to be methodical. We first checked for the presence of the mains-derived 25V regulated supply, since this provides the power for the thyristor's triggering circuit. The 25V was present and correct, but it was difficult to make sense of the other voltages because the h.t. voltage hadn't been established. So we checked for voltage at the anode of the thyristor, and the whole thing immediately sprang to life again. In fact anything metal touching the thyristor's heatsink or the diode in series with the thyristor on the input side started the damn thing up. So for want of anything better to do, we changed the diode and the thyristor. The thing then started up without any prodding. We hastily put the back on and started to prepare Mr. Piddlewell's bill.

"It's gorn off" he said.

I stopped writing, closed my eyes, gritted my teeth and rocked back and forth slowly. Off came the back and the testing (me or the set?) started again. Nothing made sense till we touched the input to the thyristor. All services were then restored.

"It's a loose wire" said Mr. Piddlewell helpfully.

"*******" I replied.

I then started mumbling to myself about trigger pulses arriving too late or not at all, and again removed the panel. I changed the three transistors in the trigger circuit, all suspect resistors, the relevant capacitors and the two diodes. The set then worked faultlessly, and off went Mr. Piddlewell without his bill – just in case. The next day he came back.

"It went off half way through the football" he gritted. "Leave it with me for a few hours" I sobbed.

Alone again, I crept up on it. The 25V line was o.k., and any attempt to check on the a.c. side restored the set to life. Out came the panel and, with it suspended by the wiring, I tried to take some readings without touching any point that would prod it back to life. Unfortunately I was stupid enough to allow the 25V regulator's heatsink to touch one of the a.c. mains tags on the input choke. There was a flash and the fuse blew.

With a heavy heart, I checked the 25V regulator transistor. It was short-circuit of course. I replaced it, but there was obviously some sort of short somewhere along the line as the 51Ω resistor in series with the transistor was overheating. Disconnect the 25V output plug 10/5 to the decoder/i.f. panel and the short clears. So we set about the tedious task of checking for shorts on this panel, and finally found it on the small a.f.c. subpanel, where a disc capacitor had gone short-circuit.

This was replaced, and on refitting the plug the BBC World Service commenced to read us the news. I'd met this one before and immediately accused the small eight-pin chip (MC1330 or equivalent, video detector) of playing about. Replacing it rewarded us with more normal sound, but not a sign of a picture as the MC1327 chroma demodulator/matrixing i.c. had also been dealt a mortal blow. With this replaced we had a picture and everything seemed to be in order. It then dawned on me that the power supply still had an intermittent fault, and sure enough the

next time we tried to start it nothing happened until we touched the input to the thyristor.

At this I lost my cool. I took out the 4443 thyristor, replaced it with a 4444, and shorted out the series diode so that the full a.c. was applied to the thyristor. "If you need a prod" I said, "have one!" No further trouble has been experienced since then, and if the trigger circuit really was at fault it hasn't said so. Mr. Piddlewell has his set back, and will pay (I hope) when it has worked for a week without fault. So sorry you've been inconvenienced sir.

More Black Comedy

Following that I'd have liked to have had a nervous breakdown. There wasn't time however. An ITT CVC32 came in with the power unit tripping.

Removing the line oscillator panel stopped the tripping, so we checked everything in the line output stage, noticing that a new tripler had recently been fitted (not by us). Now if all the diodes are o.k., together with the line output transistor and the scan-correction capacitor etc., one has to look askance at the line output transformer. Upon fitting a new one normal operation was restored. The moral here seems to be that if the tripler fails the transformer is also suspect, which pleases the customer no end.

When the second CVC32 came along therefore you could say I'd been brainwashed. When it was switched on it tripped a few times and then went quiet. So I took out the oscillator panel and the set stayed on with a whistle to say that it was unloaded. I checked the line output stage – transistor, diodes, etc. – having already unhooked the tripler to no avail. "The transformer's gone" I thought.

So I fitted another and left the tripler disconnected. The set behaved exactly as before. A couple of humps, then back to silence. It then occurred to me that I hadn't checked the overvoltage preset (the bottom one). A slight touch on this restored the supply line and enabled us to set the thing up according to the book. Caught again. Back went the old transformer (sorry to have bothered you), on went the tripler (sorry to have suspected you), and the set was left on test for some hours just to be sure.

In passing, the model had full remote control. This functioned very well, but the off button didn't seem to be very positive in its action on the switch relay, or rather the relay seemed to be sluggish in its action upon the on-off switch. We didn't pursue this as something else was occupying our innermost thoughts – the previously mentioned Mitsubishi set.

Decoding a Decoder

Surely for sheer complexity the decoder used in the Mitsubishi CT200 must take the cake. Not, I hasten to explain, that I'm an expert on decoders, and I rarely tackle any kind of imported colour sets apart from those we've sold ourselves. The reasons for our reluctance to become involved with all the Sonys and other far eastern solid-state colour sets around are first because we don't feel inclined to stock up with spares which we may or may not need to use, and secondly because I'm a coward and hesitate to tackle anything I'm not familiar with.

A friend had had a great deal of trouble trying to get his CT200 fixed however, and had been without it for months. So in a weak moment I said I'd have a go at it, as nothing should take that long to sort out. The complaint was simply no colour. We looked up the circuit and received our first shock – all those f.e.t.s and other transistors dotted all over the place, in addition to one i.c. and two crystals . . .

Since the chroma demodulator i.c. drives the three colour-difference output transistors, this seemed a logical place to start. Injecting signals at its outputs got the output transistors going and produced pretty coloured patterns, but it was hardly surprising to find that this was as far as we got since there was no voltage supply to the i.c. The rectifier (D605) which provides this was open-circuit – it's right over on the far side of the panel. Replacing this restored correct voltages around the i.c., but precious little else. So we plodded backwards and found that the final chroma amplifier Q607 was open-circuit. Replacing this didn't help much either, so we went back and found (cutting a very long story short) several bipolar transistors and one f.e.t. defective.

Rotating the colour-killer control now gave us some bars of colour which couldn't be locked. This was not surprising, because there were hardly any burst gating pulses reaching the two reference oscillator control loops (it's one of those non-PAL decoders). They were present at the input to the decoder panel, but got lost on the way to the gating transistors. We finally found that the choke (L608) across which they are supposed to be developed apparently had shorting turns – it never gave the same reading twice. Replacing this with a coil (complete with core and shunt capacitor) from another decoder sent gating pulses where they should go, and we had colour which locked once we had realigned the coils (these had been disturbed, along with every preset on the board).

We could now rotate the colour-killer control to its proper setting, and decided to change channels to see whether lock was maintained. The button we pressed had not been set to a channel, so we got only a hiss on the sound and no picture. There was also another hiss apparent however, coming from the vicinity of the tripler. Before we could switch off there was a loud splash, and something appeared to be aflame somewhere down in a covered section.

Once the immediate panic was over, we found that there's a 200MΩ bleed resistor housed in a long vertical tube of heavy insulating material at the e.h.t. tripler's output. The insulation had broken down, and there'd been arcing across to the nearest earthed point. There was also a mound of silicone "putty" around the top of the tripler, so it would seem that a discharge had occurred earlier in the set's history. Perhaps this was the reason for the multi-faulted decoder board.

With the discharge problem overcome, we turned to the tuner again and tuned it in. Sound o.k., picture o.k., no colour. Gating pulses were still getting through, and we then found yet another 2SC710 transistor open-circuit, making four of this type we'd replaced. Is there something about this type of transistor that makes them hypersensitive? We fit BC108s and get no more trouble.

We again had colour, but it still seemed to lock weakly on channel change. After that brief second of hesitation however it couldn't be faulted so we called it a day.

Many, many hours had been spent on this hideous decoder, much of the time finding our way around it and trying to understand the meaning of some of the terms used. With thirty odd transistors including the colour-difference output ones, four f.e.t.s, an i.c. plus another half a dozen transistors on the same board for the luminance channel etc., this must be something of a record. Mind you, time could have been saved if I hadn't inadvertently consulted the CP140 decoder circuit instead of the CT200 half way through the proceedings.

If I worked for anyone other than myself, I'd be sacked on the first day.

with each other of course.

The Philips system is the most sophisticated one (and therefore the most expensive). A high-power laser is used to cut the master disc, from which copies are pressed. The player uses a low-power laser, currently gas but eventually semiconductor, to read the vision and sound signals on the disc. A servo system keeps the laser beam centred on the information track as the laser scans the disc. This totally contactless system has a number of advantages. No wear of course, while fast forward or reverse with picture, jumping from frame to frame by number and freeze frame are features easy to incorporate. The wide optical bandwidth gives excellent picture quality, and dual-language or stereo sound has been possible from the start. These features have made it a natural choice for educational use, and the system has recently gained the backing of a company called IBM for just that purpose.

The RCA CED system was second on the scene earlier this year but is number one so far as the publicity is concerned. The information is stored in the form of capacitance variations between a metalised layer within the disc and the metalised stylus used to track it. The concept is far simpler than the Philips one in terms of the electronics required, but offers far fewer features, stereo sound being a notable absentee at present. An estimated $20 million has been earmarked for publicity this year alone. Zenith are also backing the system, and since the two companies control 50% of the US colour TV market it stands a good chance. This is something it will need – RCA admit that it took 17 years and $150 million to develop (some industry sources put the figure at double that).

The US colour TV market is remarkably buoyant at present despite the 85% saturation and the recession, and manufacturers are looking to video to give them a boost. RCA expect to sell around 200,000 CED players this year, so the publicity alone works out at nearly $1,000 a player, which is not shown up in the selling price. Hitachi, Sanyo and Toshiba have also introduced CED players.

Due next year is the JVC VHD (Video High Density) disc system. JVC's parent company Matsushita is the world's largest consumer electronics company, and in the US the system is being backed by General Electric, which has the fourth largest share of the US TV market. Technically the VHD system sits between the other two, offering more features than CED but less than LaserVision (as Philips now call their system), at intermediate sophistication and end price. The information is again capacitively stored, and the metallised stylus is in contact with the disc. It doesn't ride in a shallow groove as in the CED system, being servo controlled instead.

The pricing of the LaserVision and CED systems is known, but that of the VHD system has yet to be announced. The published prices for the Philips and RCA players are $700 and $550 respectively, though I've seen them both at under $400 in special sales – and there seems to be one of these every week of the year here.

Video Separates

Something that seems to be popular here is "video separates" – a no frills, portable VCR with another module that provides the tuner and timer functions. Portable sound/colour video cameras are starting to sell well as a better alternative to cine – no processing delays, longer recording time (if you can afford the batteries) and easy sound editing. For the future, the talk is of thinner and thus longer playing tape and of small cassettes, possibly using metal particle tape, for combined camera/cassette systems. The latter could really upset the 8mm. film market, so the cine camera firms are beginning to participate actively in video developments. Be prepared for more developments to come: the video age is here!

There's a Funny Smell . . .

Les Lawry-Johns

THEY say that lightning never strikes twice in the same place. This isn't true. I don't mean that lightning has struck me – it's about the only thing that hasn't, and perhaps a quick flash might buck me up a bit. No, you know what I mean. Unusual things that anyone else would remember happen to me, but on the second occasion I find myself muddling through as usual until it suddenly dawns on me that I've had it all before and that I've spent several hours beavering away quite unnecessarily. There's probably something wrong with my prostate gland because . . . oh well, never mind.

I was trying to work out why this Bush colour set (A823 chassis) wouldn't start. A.C. was present at both ends of the surge-limiting thermistor and up to the anode of the thyristor h.t. rectifier/regulator, but I couldn't establish the h.t. supply. Anyway, someone came in with an urgent job and all the a.c. outlets were full up with soak test items that were happily doing whatever they were supposed to be doing. So I disconnected the Bush set and put it to one side, plugging in the Minivox portable that this chap who was going on holiday in an hour or two and wanted to take with him had brought in. Now I'm not all that familiar with these small Yugoslavian TV sets, having had only a single tussle with one of them before.

Since time was limited, I did it all wrong from the start. I plugged it in and there was a hum and some noise on the sound side with the tube's heater lighting up. So I concluded that the l.t. line was o.k. and that the fuse on the top right rectifier/smoothing panel was intact, as it appeared to be. I removed the tube base socket to allow the panel to be swung open, and started to check the supplies around the line output transistor. The result was that I became confused by a collection of negative readings of a low order and in the wrong places, though I didn't have the circuit to see what the readings should have been.

After much shilly shallying, I found a supply on a socket but nothing on the next pin which should have fed the line output stage. So I chased the plug wires back, and guess where they went? All the way back to the fuseholder on the top right supply panel. The fuse was open-circuit, though the spring was clearly intact. It wasn't the l.t. fuse at all of course: it was in series with the supply to the line output stage. A meter across it gave a normal reading, i.e. no excessive current, so a new fuse was fitted and a job that should have taken minutes had, once again, taken half an hour.

"Never mind" said the owner, Basil. "We all make mistakes and I suppose some take longer to do things than others. Don't blame yourself."

"Take it back to Yugoslavia next time if you want it done quickly" I growled petulantly.

So off he went on his holiday. Who wants a holiday anyway? People get hurt on those things. You should hear them moaning when they get back. This was wrong, that was wrong. Good job I can't afford one really. We may have a half day at the seaside later in the year, to find out what Madam Martine has to say about the problems the future holds for us.

The Smell

Honey Bunch then popped in to see if any money had gone in the till. "You haven't done much today – what's that funny smell?"

"Must be the dog" I suggested.

"It's not Ben. He's out here with me and doesn't smell any differently from usual. It's a smell like you make – I mean it's a smell like a set cooking up."

"I can't smell anything unusual" – and in truth I couldn't. So off she went to set her hair or whatever women do all day long, and I put the Bush set up again to renew the battle. This time I didn't use the isolating transformer socket, plugging it into a direct mains outlet instead – more for convenience than for anything else. The set came on straight away, so I plugged it back into the isolated bench supply and it didn't.

Like a flash my lightning quick mind grasped the reason for all this. As it had done not all that long ago when precisely the same thing happened – the mains isolating transformer had developed shorting turns, with the result that it wouldn't start up a thyristor power supply. I too could smell the smell. Anyone with half a nose could smell it. The transformer was hot to the touch when I touched it, so I didn't touch it any more. I gave it to the dustman, who apparently does a bit of totting on the side to bring his salary up to that of the prime minister.

Return of Beardy and Non-beardy

I hadn't seen Beardy and Non-beardy for some time. On the last occasion they brought in a Bush monochrome set (TV161 I think) whose main electrolytic hissed all over me, which made them laugh no end until they got the bill. "Oh dear oh dear, such a lot of money." This time they brought in a 26in. Ferguson colour set – one fitted with the 9800 chassis.

"The picture keeps going down to a line you see, and I hit it bang on the top like that and it comes back again. My friend says it's a loose wire. We'll come back to collect it later."

When I got around to it I put the set up on the bench, with just a raster showing, and noted that the volume control slider shaft (and thus the knob as well) was missing, necessitating a finger nail to obtain adjustment. Child-proof provision I thought. Vibration caused the raster to collapse, and we were soon under the line output stage panel at socket PL851 looking for dry-joints. A couple of likely contenders (the 47V supply to the field timebase comes from the line output stage) were found and dealt with, and just for luck we checked the plug as we've found poor contacts here in the past. Replace panel and screws, plug in aerial, everything fine. So I wrapped it up and wrote out my charge for service.

When they returned, Beardy immediately looked at the set and said "where is the knob which is missing?"

"The knob was missing when you brought it in, so don't try pulling that one on me."

"No no, the knob was there earlier you see."

"You probably knocked it off in the car then, when you put it in or got it out. It's probably still there, but it won't do you much good if you find it because the shaft has snapped off as well."

Non-beardy went to look in the car but couldn't find it. Beardy started "you will put on a new knob, and find the old one here in the shop later perhaps."

"It doesn't need just a new knob, it needs a new control since you snapped off the shaft getting the set out of the car."

This exchange continued for some little time, then lapsed. "Let us see the set working" said Beardy. I sighed and wished them gone, but heaved the set back up to show them my fine work. The raster came up nicely and remained steady, but there was no picture on it.

"Where is the picture?" asked Non-beardy.

"Buggered if I know. It was there a minute ago" I grunted, removing the rear cover again.

"The picture is on" said Beardy. "You haven't put the set right because this is why we brought it to you."

"Oh no it wasn't. You brought it in because the picture collapsed to a line and came back when you bashed the set, which was probably when you knocked the volume control off."

"No no, the picture never comes on straight away. How much have you charged us for not doing the TV?"

I whipped the bill into my pocket. "If I haven't done the job, as you say, I can't give you the bill." Obviously while tackling the field collapse fault something had had time to warm up and start working, which it didn't want to do when cold. The signals panel (i.f. strip, decoder etc.) varied slightly over the years, with the 8000, 8500 and 8800 series, but retained the basic arrangement with transistors to provide i.f. amplification followed by a chip or two. So I tried the freezer, but the thing wouldn't stop working. Eventually I found that, paradoxically, from cold there were no signals until the upper left TCA270SQ video detector etc. i.c. was sprayed with freezer, when signals burst through – not by heating it as I'd thought.

"What is that stuff?" demanded Beardy.

"Hold your hand up" I suggested.

Beardy half held his hand up and I gave it a blast of freezer. Beardy howled with surprise more than anything else, and Non-beardy fell about laughing, just as he did when the capacitor sprayed all over me.

"Right" I said firmly. "We've had our little laugh, let's get down to it. If you want the set to start straight away, we've got to put one of these funny black things in and however much you shout and bawl you'll have to pay for it."

"How much will you allow us off for the volume knob you broke?"

I'll draw a veil over what followed. Suffice it to say that Beardy and Non-beardy will not be seeking our help in future, and will not therefore adorn these pages again, despite the fact that the editor seems to find them very entertaining and appears to have an affectionate regard for everyone who gives us a lot of trouble. Funny that ... (Bring back Grace and Sid I say – editor.)

Woman's Instinct

A Pye hybrid set (697 chassis) was brought in with the complaint no sync. Since the picture was there, though the colour was intermittent, my amazing powers of deduction

led to an instant diagnosis. The reasoning went along the following lines. Since the sound is o.k. and the picture is present, the fault must lie in the very small area between the second video transistor VT6 and the sync separator VT7 (see Fig. 1). The sound and the chrominance signals are tapped off at an earlier point, and the fact that the colour is touchy must be due to the fact that in these chassis the burst gating pulse is derived from the sync pulse. So the sync separator just had to be at fault, probably because its base bias resistor R33 had increased in value. Without a second's hesitation, I swung open the i.f. panel and deftly removed the resistor. Didn't even bother to check it, just fitted a replacement and quickly checked the sync separator transistor VT7.

Full of confidence we switched on, and got exactly the same symptoms – no sync and no colour. Things were no better after I'd been around the sync separator stage with a fine tooth comb.

By now Honey Bunch had done her hair or whatever it is that women do all day long, and was standing in front of the Pye, fiddling as usual.

"It's the contrast control" she pronounced.

"Oh yes?" I said. "What leads you to this clever diagnosis when I've been sweating here for an hour or more?"

"The picture steadies and the colour comes on when I move the contrast control sideways."

I was about to make some smart remark when realisation burst upon me. The 697 has a printed panel to which the controls are directly connected (no leads). If the earthy end of the contrast control was dry-jointed at the panel, picture information would still get through since there'd be circuit continuity, albeit at high impedance, via the colour control, but VT6's collector would not have much to offer the sync separator by way of a signal. Out came the panel and the diagnosis was proved. All systems were restored with a dab of the soldering iron.

"Now that I've sorted that one out for you, I'll go and get supper ready" she said. How I hate self-satisfied women.

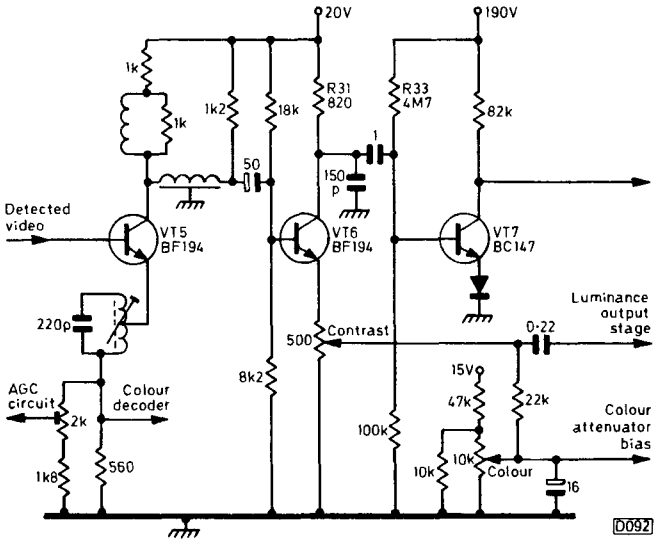


Fig. 1: Video and sync separator circuits used in Pye hybrid colour chassis. The detected video is fed to VT5, which drives VT6 from its collector and provides feeds to the decoder and a.g.c. circuits from its emitter – a separate detector is used for sound. VT6 in turn drives the luminance output stage from its emitter, via the contrast control, and the sync separator transistor VT7 from its collector. R33 provides VT7 with base bias so that it saturates when a sync pulse arrives.

A Visit to Mr. Nasty

I thought I was selfish till the other day. I can now tell you that you and I are absolute angels, full of consideration and compassion for our wives and families, who should think far more of us than they do. Our wives should treasure us indeed. But for the wheels of fate, they too could be married to a chap like Mr. Nasty.

I called at his house because he couldn't possibly bring his set in. In fact he had to be taken everywhere by relatives in their cars, because he had difficulty walking. Except to the pub and back, which didn't seem to be any effort at all to him. As a matter of fact he was down at the pub when I called, and his wife seemed very agitated.

"Do you think you could repair the set before he gets back? Otherwise he'll say he doesn't want it done and can make do with the little portable, which he won't let me watch. He says there's only room for him to watch it, but I can listen if I sit back out of the way."

I listened to this affront to the rights of women with some doubt, but agreed to hurry up if I could. She dashed off to the kitchen, saying that she had to put the oven up high again because he wouldn't eat his dinner unless it was piping hot.

I took the back off the set: it was a Thorn 3000, with a blank raster and faint sound. A quick check on the i.f. panel showed that all the i.f. transistors except the final one (BF197) were functioning. I'd just finished fitting a replacement when there were signs of Mr. Nasty's approach. His wife became even more agitated, and snatched his dinner from the oven.

A small man came in, looked at the table for his dinner, and then looked at me.

"How much is that going to cost? Because if it's too much don't bother – I'll watch my portable."

"You haven't much option" I told him. "I've already done it and don't propose to undo it." The change was remarkable. "'Course not old chap. You've done it and want paying. Why not?"

At this he sat down at the table and surveyed his steak and kidney pie. "Muuum" he bawled, "you can come and cut the pie up now."

I couldn't believe it. His wife came back from the kitchen, leant over, and cut up the pie on his plate.

"Well put some sauce on it then" he commanded. And she did.

"Good darts match we had" he commented, dispelling any fears of mine that he'd had a stroke or something that stopped him using his hands. "Oh yes, nip next door and tell that bloke not to mow his lawn this afternoon. I want some sleep."

"Can't seem to sleep properly at night" he confided in me.

"Perhaps it's because you sleep in the afternoon" I said shortly. By now there was a fair picture on the 3000.

"How much is that little job going to cost?" he asked, his mouth full of hot pie and sauce. I quoted what I thought was a very reasonable figure (too reasonable to tell you), whereupon he stopped chewing and started to choke.

Recovering, he told me he'd phone his son who would call round to the shop and pay me. At the same time his wife reappeared and continued the conversation about his inability to sleep at night.

"He doesn't get his rest. Every hour he tells me to get up and open the window because he can't breathe properly, or close it because he's too cold."

It was all too much for me. I just had to rush home to tell Honey Bunch that Frankenstein's monster is alive and well.

Crossed Lines

Les Lawry-Johns

SOME time ago I reported on the condition of Laura Lovitt's loose legs. On her dicey Decca of course. Also her collapsed frame which was restored to full working order after a quick visit to the bedroom – to plug in the iron as there isn't a plug point in the adjoining lounge, which surprised me.

I'm easily surprised, and my eyebrows seem to be permanently arched over something or the other, usually the latter but sometimes the former. I mustn't chatter on however or the editor may edit. Look what he did to my gravestone: he cut out "he he". If there's one thing that should be seen more on headstones it's more he he and less poor buggers. Never mind, one day he'll realise he's erasing some of the world's finest literary efforts, and without a passing thought at that.

Anyway, Laura had phoned to say that her set wasn't working, and I'd said I would call during the afternoon if she'd nothing on. So I nipped up to the bathroom for a quick shave, shower and shampoo while my wife looked on in amazement. This annoyed me for three reasons. First because she seemed to think it unusual for me to have a clean up. Now I'm not the scruffy type. It's just that I don't like wasting water and razor blades, so I normally clean up in the evening after the toil of the day. Secondly because she was also laughing. I haven't been too good lately and I've been under the doctor for a funny thing and the pills haven't done much good either. And finally because she wasn't annoyed.

"Give my love to Laura" she said. "After you've fixed her set I hope she'll find something worth looking at."

I ignored that remark. "I wonder whether she's still keen on that telephone chappie" I mused.

"Oh, you mean Eric. He's thirty years younger than you and he's coming here this afternoon to run an extension into the bedroom."

It was my turn to be amazed. "You Jezabel" I bawled with righteous indignation. "Planning to get me out of the way when that fancy fellow calls. No wonder you were laughing at me when I was having a shower."

"I wasn't laughing. It's just that I don't like to see dead horses being flogged. Laura said that Eric is an up and coming young man." It was all too much.

"Right. I'm going to nip down to Laura's to fix her set before you can say knife, then bring the knife back here to cut the telephone communications in the bud."

"All right love. Don't rush about though. You know it's bad for you."

It was under this cloud of torment and suspicion that I called to put Laura back into working order. Knowing these Decca hybrids fairly well, I'd packed into my case everything I thought I might need. Except one thing that is. The yellow van just had to be outside when I arrived.

The Dicey Decca

There they were laughing and chatting away. Blockheads. What these women see in Eric escapes me. He must keep it hidden. I decided to give him a lesson in advanced technology. Instant diagnosis and immediate remedy would really shake him. And give him an object lesson on the advantages of private enterprise over these top-heavy nationalised industries with their multilayer layers of layabouts all passing the buck to one another and getting nothing done. So I whipped the back off the Decca.

"Can you make it snappy Les?" asked Laura. "I've got a lot to do today."

The h.t. fuse had failed, and a test between the top cap of the PY500 and chassis revealed an almost dead short. "Nothing to it Laura. Just a shorted capacitor. I'll just check the suspects and stick another one in." So I confidently clipped the boost capacitor on the lower panel and connected the meter across it. No short.

"Bloody disc on the tranny" I thought out loud. The harmonic tuning disc ceramic was also blameless however, and it then dawned on me that there was a real possibility of the line output transformer having a short between its windings. This was the item I'd not brought along of course.

"Sorry Laura, I'll have to run it back to the shop to fit a new transformer. Should have it back by five o'clock with a bit of luck." Laura looked at Eric and then said it would be fine.

"Aren't you coming to our place this afternoon Eric," I asked.

"No. The new fellow Desmond's doing that one. Probably done it by now. Fast worker. We don't waste much time on this job – we carry all the gear we need with us you see."

So I shoved the Decca in the van and hot-footed it back to the shop. That little demonstration of 100% efficiency hadn't quite worked out as intended.

Back at the ranch, Honey Bunch was looking as bright as a new pin. The nice chappie had called, done the job and departed. "Quite a dishy young man" she said. "In and out before you could say stud." The torture continued without a pause. "You didn't have much luck with Laura then?"

Bush Rangers

We seem to have quite a few of the little white Bush monochrome portables coming in – the ones fitted with the T16A chassis. The common failing is that the BF257 (BF337 or whatever) video output transistor has a high casualty rate, leading to a picture with an empty plastic look or no picture at all. The answer is to fit a new output transistor plus a heatsink – one of those nice round ones with fins is ideal. If you can't put your hands on a heatsink of the approved variety you can use the shell of a coaxial plug, clipping the side to make it fit if necessary. We refer to the metal type of plug of course, not to the part plastic ones, some imported examples of which don't even fit our standard coaxial sockets let alone a transistor . . .

8500 Focus Fault

We often have trouble with the thinner, square type of thick-film focus unit used in the Thorn 8500 etc. chassis. So it came as no surprise when Mr. Piddlewell turned up again with his set. You will remember that we had a certain

amount of trouble with its start-up problems a little while ago. "Tube's gone" he announced flatly.

"No it hasn't" I announced, having had a look. "It's either the focus unit or the 100kΩ resistor on the tube base."

"I knew it was something to do with the tube" he said.

So we checked the 100kΩ resistor (in series with the focus electrode). Nothing wrong here. While next removing the focus unit screws I explained what happens when the thick-film track in the unit becomes practically open-circuit. I showed him the effect of having no focus voltage by removing the lead from the unit to the c.r.t. base panel. To my amazement the focus improved enormously – the picture was quite watchable, though we watched it for only a very short time.

To cover my confusion I switched the set off and proceeded to fit a new unit, mumbling something about the focus electrode borrowing some potential from the final anode for a short time. When the new unit was fitted I switched the set on and found the picture back in the grossly out of focus condition (at all settings of the control).

"It's better off without the bloody thing" said Mr. Piddlewell.

"That's silly" I said, "everyone knows you've got to have a high focus voltage with this type of tube."

"I don't. All I know is you've got to have a little adjustment to get good focus" said Mr. Piddlewell.

"How can we adjust something that's not there?" I argued reasonably. Having almost made my point I made the final diagnosis. "The e.h.t. rectifier unit must be up the creek."

"What's that got to do with the focus?" asked Mr. Piddlewell, sipping his coffee which No. 1 supplies for all potentially awkward customers.

"The focus unit receives its supply from the rectifier unit – this lead here" I said. "The rectifier's not providing sufficient output you see."

"How come it's better with none at all then?"

"Ah, that's the rub you see. If the focus electrode is not connected at all it floats, taking up a potential somewhere between that of the first and the final anode" I said.

"Sounds like a load of old bull to me" said Mr. Piddlewell unkindly.

"All right then, wait and see what it's like with a new rectifier." I was hoping I hadn't got one, but there it was on the shelf. In it went and I crossed my fingers, legs and eyes.

Perfect. "There you are you see. Faultless diagnosis."

"No it's not. You said it was the focus unit or that resistor thing on the tube base. I bet the thing you've just put in is dearer than those." Mr. Piddlewell's thoughts were becoming wonderously concentrated as he sorted out his priorities. "With the troubles I've had with this set lately I don't think I should pay anything at all."

"Don't then. Go somewhere else and see if they'll give you coffee while they sort out your clapped out old set."

"What do you mean, clapped out?" demanded Mr. Piddlewell indignantly.

"Well, the tube's going for a start."

"Right then. Now I'm not going to pay, and what's more you won't get your milk tomorrow morning."

The sooner the common market does away with our milkmen the better I say.

Anne's Troubles

Anne is a local character who can't see why the world should be a different place from what it was fifty years or so ago. Her age is a secret, and she's a little woman with a loud voice, very fond of a flutter on the horses. She goes into the bookies and puts sixpence each way on this horse and sixpence each way on that. The bookies don't hesitate to accept her money, even though she moans about two bob being a lot to pay out. Anyway, she popped into tell me that her sound had gone off.

"I'll be up this afternoon, Anne."

"You can't come this afternoon mate, I'm having my hair permed. I'll borrow a set from the pub tonight. You can come tomorrow. Make it two o'clock. Don't be late: I go down to the bookies at half past."

So next afternoon at precisely two o'clock we pulled up outside. The set needed a new PCL82 and a couple of resistors.

"I suppose you're glad of the work, the way things are" said Anne.

"Yes thank you Anne."

"That's all right mate. Now what do I owe you?"

"Seventy five pence please Anne."

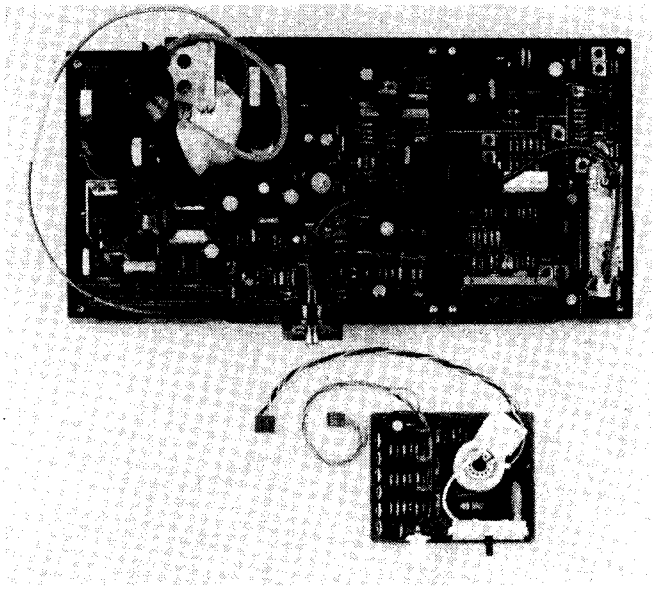
"Here's a pound. Keep the change – I believe in paying a man his worth. You can put the plug back on the set I borrowed from the pub before you go, it'll save them having to do it later."

Test Report

We've just taken in our first batch of Fidelity CTV14R colour sets – and very nice little sets they are. British made and fitted with a 14in. Toshiba black-stripe tube. The picture strikes us as being exceptionally bright and well defined.

The hand-held infra-red remote control unit changes the six selected channels positively, and the off button switches the set off when depressed for a few seconds. Removal of the rear cover (sensible screws for a change) exposes the well laid out horizontal panel, with everything easy to get at and the presets clearly marked. If servicing is required, it looks as if this is not going to present any problems. One of the sets had a tendency to jitter vertically, but only when the tuning cover was up to close the a.f.c. switch. The a.f.c. coil was clearly marked on the front right-hand side, and a slight turn of the core of this instantly cleared the instability.

Full marks Fidelity. This set looks a winner, and has a very reasonable price.



The main panel and c.r.t. base panel used in the Fidelity CTV14R 14in. colour transportable. The low component count and neat layout should make any servicing required easy.

A white "AFN" symbol is superimposed from time to time, presumably to prevent unauthorised copying (similar to the Italian RAI practice). The only vision identification is at the start of programmes (see accompanying photo), though there are audio identifications – "you're watching AFN, Shape" – during many breaks between programmes.

Alan uses a Grundig TV set which switches automatically between the 4·5/5·5MHz sound signals (Grundig have dual-standard sound i.f. modules for systems B/M and B/I). He mentions that the pull-in range of the TDA1170 field timebase i.c. used in his set is such that the field frequency control can be set for perfect sync with both 50 and 60Hz signals. With the height control set for a 625-line picture however the height will be about 20% short on 525-lines. To overcome this problem it's necessary to reduce the resistance between pin 7 of the i.c. and chassis.

Ridley Relents

Les Lawry-Johns

RIDLEY'S been a valued customer of mine for many years, and a friend to be even more valued when the wind has blown against us which, fingers crossed, it hasn't done for a considerable time. Throughout the colour boom Ridley stuck to his monochrome set, saying that colour had no fascination for him at all. Anyway, I'd just sold a 22in. Pye colour set (K30 chassis) to a chap who'd come to buy a pair of headphones when Ridley came in.

"You'll never guess what I want" he said.

"I think," I said carefully, "you've decided it's about time you had a colour set. Why?"

"I was out at Bob's place last night and he put his set on to catch the golf highlights and you know, Leslie, it does look better in colour after all. So I thought I'd pop in and give old Les a shock, and here I am."

"You certainly have Ridley. If you can do a U-turn anything can happen."

"Well what do you suggest? It's got to be British of course."

"Of course. What about a nice 22in. Pye set like the one that chap's just chosen – with a bit of help of course."

"Is it British? I thought they were part of that Dutch lot."

"Well yes. European co-operation and all that. The tube's French, but we'll insure it for four years so you've nothing to worry about. Have a look and see what you think" I said, busy unpacking one from its box. Up on the bench the picture appeared in a matter of seconds and Ridley was clearly impressed with the clarity of the picture and sound.

So we piled it into the van and installed it in its appointed place in Ridley's lounge. Switching on didn't produce the fine picture we expected however. It immediately started to trip. Hrrrump bonk it went.

"Oh dear" said Ridley. "It doesn't like living here". "'Course it does" I said. "Probably didn't like the journey. Jet lag or something."

"That's just fine" said Ridley. "Can't travel half a mile before it starts huffing and puffing. My old set could travel to Cornwall and back without turning a hair."

I knew I had to do something, so I took the back off and stared at the large panel. Employing the latest of servicing techniques, I gave it a sharp tap with the end of the screwdriver, somewhere around the centre section. The set stopped huffing and puffing, produced a perfect picture and talked to us nicely enough. "There you are. You just have to show them who's boss." I tapped it some more, thinking that the something or other that was playing about would play about some more, but it didn't. The set continued to behave impeccably, which was just as well since I've not yet become an expert on the K30.

If Ridley had any doubts he kept them well hidden and seemed pleased with the performance (the set's, not mine). So another sale was made and another triumph was notched up by my screwdriver.

More Puffing

Back at the ranch Honey Bunch told me that another old friend had phoned to say that his set was playing about. So I rang him to ask what was up.

"Hallo Len. What are you moaning about now?"

"It's this set of mine Les. It comes on and then goes hrrump and goes off and won't come on again till I press the red button at the back. It'll go for some time and then starts to bugger about all over again. You know it's too bloody big to put in the car, so you'll have to stir yourself and come down. Oh yes, and bring one of those colour portables with you. Dot wants one for the kitchen so she doesn't have to watch football."

So we prepared to do battle with Len's 26in. Ferguson (3500 chassis). Pile in everything just in case, including a spare power panel, and don't forget the portable and the battery for the remote control unit. Off we set, wondering whether the portable would show symptoms of jet lag when we arrived.

First we demonstrated the portable, which performed perfectly. So Dot (Len's wife) took it off to the kitchen, proclaiming that Len wasn't going to watch it even if the big set did huff and puff.

The 3500 wouldn't play up when we wanted it to. So we switched it off and tried again after taking some liquid refreshment. This time it did play about, and as the red button cut out seemed to restore normal operation we changed this first. No difference of course.

As there was plenty of voltage on the body of the chopper transistor when the set went off we turned our attention to the 30V line. There was only 30V instead of about 45V at the 1,000μF reservoir capacitor, i.e. at the input to the 30V regulator, but the voltage increased to normal when we prodded the capacitor, the set coming to life again. The electrolytic usually dries up, preventing the set working altogether, but on this occasion there seemed to be a poor leadout contact. A replacement capacitor cured the huffing and puffing – presumably the act of pressing the red button had momentarily interrupted the supply and sealed the poor contact.

I've been Struck

We've had some pretty severe storms of late, so it was no surprise when Mr. Allen phoned to say he'd been struck by lightning. Not really him you understand but his set, another large Ferguson – this time with the more up-to-date 9800 chassis.

When I arrived he pointed to a heavy chrome ornament. "That was on top of the cabinet. Must have attracted the lightning to the set" he proclaimed. I've found it best over the years not to disagree unless it's absolutely necessary, since I don't know all that much about these

things. So I nodded my head and then shook it in sympathy. "Funny thing lightning. Scares me stiff. Never know what it's going to get up to next." "It struck my umbrella once" said Mr. Allen. "There was nothing left but the wood. Made me feel quite funny at the time." I tut-tutted as I removed the set's rear cover.

It seemed to be perfectly all right until I took a closer look at the upper left mains input subpanel. A diode here was in two halves, while a resistor was a small, charred mass. I thought at first that the diode was the one in series with the thyristor h.t. rectifier/regulator, and then realised that this is on the lower power board. The damaged diode was the first one (W810) in the start-up circuit, the resistor being the following 470Ω one (R814). The path appeared to have been via W810, C810, R814 and VT810, which appeared only as three small wires with no transistor body to contain them.

A small voice inside my head told me not to muck about with the set there and then, but to take it back to the shop as it was going to be a long story. The voice was right, because when I ignored it and replaced the damaged components the set immediately began to trip like mad.

So we hauled the monster into the van and subsequently spent several unhappy hours on the bench. A replacement power panel was eventually fitted. This stabilised the supply lines (the line output transistor had been replaced earlier in the proceedings, along with quite a few associated components which had been dealt a deadly blow). We then had a raster but no signals, and naturally thought that the tuner must have been the first casualty. In the event, the tuner seemed to be about the only item completely unharmed. This is not quite true of course, but we had to replace two i.c.s on the signals board before normal reception was restored, suggesting that there'd been a sudden and drastic increase in the supply voltage.

Mr. Allen also appeared to have been struck by lightning when I presented him with the bill. When he recovered, he told me that lots of funny things had happened up and down his road as a result of the storm – and not only to TV sets. Cookers wouldn't cook, freezers wouldn't freeze, and one house will have to be completely rewired because the wiring vanished, leaving only trails of dust where the cables had been.

"All the copper just vapourised – puff" said Mr. Allen impressively.

"You were lucky it only got to your TV set then Mr. Allen, very lucky."

Who Needs Friends?

You may recall that one of our customers lives in a back-to-front house in a quiet and select area. He's a bookie or turf accountant rather, and seems to travel around the world a lot. So we go for some time without hearing from him. He turned up the other day however. Strode in demanding to see the books and claiming to be the Vatman – to the consternation of a couple of customers who were in the shop at the time. I explained to them that he wasn't really an angry Vatman but only a friend having his little joke. This seemed to amuse them as one was actually a Customs and Excise man on his day off.

It appeared that his old Dynatron was giving trouble again, so I promised to visit him later. For his part he promised to remove the twenty thousand screws that hold the back on before I arrived. The set's a CTV25, with a VCR in the top, the chassis being a 733 or 743 (I can never remember, they all look like the 725 to me). It has the vertical panels and centre power resistor and fuse in the h.t. line, and it appeared that the 56Ω section of the power resistor was open-circuit. There was a fairly low resistance reading at the end of this that feeds the line timebase, so suspicion centred on the line output transistor which proved to be short-circuit.

After a struggle we removed the timebase panel completely and then attempted to remove the transistor. Attempted is the operative word. The screws were stuck fast and no amount of heating, twisting or turning would shift them, and time was slipping by. At last I gave up and took the panel back to the shop (not having the courage to remove the set itself).

On the bench the comedy continued, until the screws were just bits of metal with holes in the top and there seemed no possibility of cutting a slot with a hacksaw. At this point son-in-law Douggie appeared.

"No problem" said Douggie, who although Greek claims to have mastery over every language including ancient Chinese. "Wait while I get my socket set."

He returned with a tool box and his brother Soffie. With a socket under each screw to support the panel, Soffie held a screwdriver (standard blade) on the screw and Douggie dealt it several almighty blows with a hammer to cut a slot in the top. The process was repeated, before my horrified but fascinated gaze, on the second screw. The screws then offered no further resistance, and the transistor was changed in a trice.

As I soldered the base and emitter contacts, my eyes were attracted to the myriad of fine lines fanning out from the source of the operation. Many tracks were in need of repair, and the panel presented a somewhat different appearance when it was at last ready for operation.

"Thanks Doug. I wouldn't have thought of doing that myself. Glad you popped in."

"No problem" said Doug.

In fact the set worked quite well when the panel was refitted and the power resistor was replaced. Once I'd located the remote control unit that is.

STATION OPENINGS

The following relay transmitters are now in operation:
Backbarrow (South Cumbria) TV4 (future) ch. 50, BBC-1 ch. 57, Granada Television ch. 60, BBC-2 ch. 63.
Beer (Devon) BBC-1 ch. 55, Westward Television/Television South West ch. 59, BBC-2 ch. 62, TV4 (future) ch. 65.
Belper (Derbyshire) BBC-2 ch. 56, TV4 (future) ch. 62, BBC-1 ch. 66, ATV ch. 68.
Collafirth Hill (Shetlands) Grampian Television ch. 41, BBC-2 ch. 44, TV4 (future) ch. 47, BBC-1 ch. 51.
Fetlar (Shetlands) BBC-1 ch. 40, Grampian Television ch. 43, BBC-2 ch. 46, TV4 (future) ch. 50.
Fintry (Scotland) Scottish Television ch. 24, BBC-2 ch. 27, TV4 (future) ch. 31, BBC-1 ch. 34.
Fishguard (Dyfed) Sianel 4 Cymru (future) ch. 54, BBC-Wales ch. 58, HTV Wales ch. 61, BBC-2 ch. 64.
Kirkfieldbank (near Lanark) TV4 (future) ch. 53, BBC-1 ch. 57, Scottish Television ch. 60, BBC-2 ch. 63.
Methven (near Perth) BBC-1 ch. 22, Grampian Television ch. 25, BBC-2 ch. 28, TV4 (future) ch. 32.
Millbrook (Southampton) Southern Television/Television South ch. 41, BBC-2 ch. 44, TV4 (future) ch. 47, BBC-1 ch. 51.
Penny Bridge (South Cumbria) Granada Television ch. 23, BBC-2 ch. 26, TV4 (future) ch. 29, BBC-1 ch. 33.
Strathallan (Scotland) BBC-1 ch. 39, TV4 (future) ch. 42,

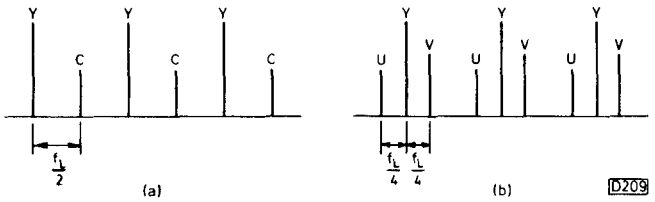


Fig. 3: Comparison between NTSC (a) and PAL (b) video signal spectra in the vicinity of the colour subcarrier.

Now you'll probably be asking why not apply the idea to the PAL system to get an even better picture? The answer unfortunately is that it won't work, not easily anyway. The problem is that when Dr. W. Bruch developed PAL he put a quarter-line offset on the subcarrier frequency (see Fig. 3). This means that the 180° relationship between the luminance and chrominance signals doesn't hold, making life difficult to say the least. You can still do this type of filtering, and in fact an allied technique is used in the latest digital standards converter units, but you need at least one frame in store and a lot of computing power, which is not economical for the domestic telly! TV is going digital however, and memory is dropping in price, so who knows what may be possible in a few years' time?

Well that about wraps it up for now. All I've got to do is to think up a subject for my next report! Maybe you'd like to make some suggestions on what you'd like to know about the US TV scene? Just drop a line, care of the editor.

Finally a tip for drinkers who are "Hitch Hicker" fans: the pangalactic gargleblaster is alive and well and living in the USA under the name of Long Island Iced Tea... Freeow!

Desolate Dan

Les Lawry-Johns

WE get a strange assortment of customers here. One of the strangest is probably Dan, whose vocation in life is the cleaning of outside pub toilets – which is why he's known as Dan the lavatory man. During his off-duty periods he goes around with an odd character called No Nose, who pushes a barrow around for a living. What's in the barrow no one seems to know, since he keeps it covered up. The two are probably friends because No Nose has difficulty smelling anything, and if there's one thing Dan has it's a smell. The principle is akin to working in a fish and chip shop – the smell follows you home. The aroma around Dan is a trifle offensive unfortunately. Even the cat, tolerant though she is about most things, beats a hasty retreat whenever Dan comes in. I can't beat a hasty retreat, so I keep a fixed smile on my face while I shake my head at whatever he asks for in the hope that he'll beat it quicker than if I nod. Honey Bunch does her disappearing act even quicker than usual when Dan is about.

Anyway, Dan brought his old Bush CTV184 (A823 chassis) in the other day with the complaint that the sound was o.k. but there was no picture.

"I've a couple of jobs to do" said Dan, "so I'll be back in about half an hour. You might have found out what's wrong by then".

"I might" I agreed, "but on the other hand I might not. But do call back. We're always pleased to see you Dan."

So off he went to slosh his toilets around a bit or whatever it is he does with them, and I turned to the set to check whether the top h.t. fuse was intact. It was, and a quick check at the tube base socket revealed that the first anode voltages were also present. The cathode voltages were a bit high, so attention was turned to the RGB output transistors which were found to be without any forward base bias. The preceding driver transistors had a negative voltage at their bases.

"Clamp pulses" I muttered, as though I knew what I was on about. There's a feedback clamp system you see, the clamp pulses coming from the line output transformer. Oh dear, all this complication. I looked at the circuit for a bit of help. Ah yes, the pulses come via the power supply panel. Let's take a look here. Two diodes near the h.t. smoothing resistors provide pulse clipping, so the bench lamp was directed on them. Glory be, one was away from its tag. Checks proved that the diodes were in order, so we soldered the diode back on and the voltages returned to normal.

Which is more than the picture did. It was plain red. The green and blue tube base voltages were right, so we thought we'd check the tube's emission. Red good, nothing on the blue, nothing on the green. Patient reactivation brought them up to scratch, but it took a time and Dan's return would not be delayed much longer. Now that the emission of the three guns was about equal, we could set up the picture for natural colours. I was quite pleased with the result.

Dan came back, accompanied by No Nose. I turned the set round so that Dan could see the results of my good work. The reaction was not what I expected.

"What have you done to my picture? It was a lovely red, now it looks like anyone else's."

"It looks all right to me" said No Nose.

"Yes, but you didn't see it the way it was" said Dan. "It was a sort of cosy colour. Made you feel comfortable just looking at it. Now it looks... ordinary."

"Don't worry Dan" I said. "It'll soon be all nice and red again. If not this week then next, or possibly next month. It'll go back to red sooner or later, and then you'll be happy and it'll be worth waiting for."

Dan looked dubious, but I had to get rid of him somehow as it was getting a bit thick and I didn't care to think what other customers would say when they came in and sniffed the local air.

So Dan and No Nose carried the set out, leaving us to coax some breeze through the shop.

Teleton Touch Tuner

We then turned our attention to a Teleton set which had been waiting for us to summon up enough patience to find

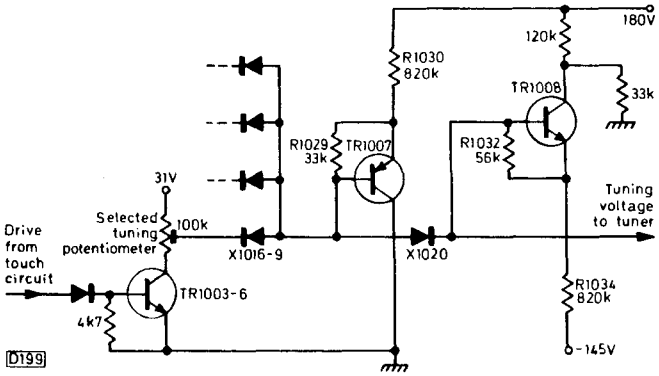


Fig. 1: Tuning voltage selection arrangement used in the Teleton Model C18BS.

out why the tuner wasn't tuning. A touch-tuner type, Model C18BS. We located the lead which should have carried the tuning voltage to the varicap tuner, but there was nothing there at all. Over to the selectors. The situation that confronted us here was as follows: about 30V at the supply end of the tuning potentiometers, but no tuning voltage output to the tuner unit – if anything there was a slight negative voltage, which was rather upsetting. We then received a distinct h.t. kick on the hand, which we'd carelessly rested on the end of the panel. Fancy that we thought, and decided to check the voltage. 180V. It feeds a couple of resistors, one of which (R1030) has the fairly high value of 820k. It seemed reasonable to see what the voltage at the other end of this resistor was. Nothing, because the resistor was open-circuit. Correct tuning was restored on fitting a replacement.

Fancy that we thought, Mrs. Crabbe will be pleased.

We then took a closer look at the circuit (see Fig. 1) to see what had been going on. As usual, there's an isolating diode in series with the slider of each of the tuning potentiometers. The idea is that only the diode connected to the selected potentiometer conducts, the others being reverse biased by the 30V supply. For the selected diode to be held conductive, there has to be a hold-on current path. This is provided by TR1007 and R1030, the transistor acting as a shunt stabiliser to hold the voltage at the junction of R1029/R1030 constant at some 1·2V above the voltage at the slider of the selected tuning potentiometer. So with R1030 open-circuit, the diode in series with the slider of the selected potentiometer won't conduct and there will be no tuning voltage output.

What does the rest of the circuit do? X1020 provides temperature compensation for X1016-9 (whichever is conductive). It too requires a hold-on current path, which this time is provided by TR1008 and R1034. The fact that the emitter of TR1008 is returned to a −145V rail explains the slight negative voltage we found on the tuning line.

And Then

Our peace was shattered by the arrival of Mr. Bore-Crashing, who claims to be an authority on all matters electrical. We'd crossed swords over his hi-fi equipment in the past, and he still claims that if he records a cassette here and sends it to a relative in the USA it will play at a different speed due to their 60Hz mains supply. This time he brought in his Ferguson colour receiver (Thorn 9600 chassis) and announced that the h.t. was low. As he was busy, he didn't feel like tracing the circuit through to find out where the h.t. was being dropped. I've learnt not to ask questions of him, because you get only a load of "I think" and "I know" but no description of the fault. So I plugged the thing in and connected it to an aerial. A picture appeared, with a gap at each side and a bit of a kink right down the centre.

"There you are" said Mr. Bore. "Not enough h.t. to fill the picture out. Now tell me I'm wrong!"

"You're wrong" I said, having had a similar case the previous week. "Your E-W modulator isn't modulating."

"There you are" he said, "it's not modulating because it's not got enough h.t. to modulate it." Too late, I realised I'd given him a new term to play with. He caught sight of Honey Bunch mucking about with the window display.

"My modulator's not working properly" he confided to her.

"You poor man" she replied, "I do hope it gets better soon."

So he gave that up and returned to watch me shining a light into the right side of the main panel to see whether W810 – one of the modulator diodes – was feeling sorry for itself. It was a bit charred, and came out in pieces. It's a BY298, but I generally fit a BYX71 as a replacement since these seem to last longer and anyway I keep these and BY223s in stock for use in this position.

"Ah, the h.t. rectifier" proclaimed Mr. Bore.

"You could call it that, but it isn't" I said wearily, not wishing to go into the niceties of 110° scanning as I lazily soldered the replacment on the underside of the panel and checked with an ohmmeter to see that I'd got it the right way round.

"We'll soon see if it works" said the impossible Mr. Bore.

It did, for about a minute or so. The picture then sort of shuddered in and out and a cloud of grey smoke came from the approximate area of the tripler. Triplers don't give off grey smoke however, and they don't smell like that. It was like what you get from a hybrid ITT set when the mains filter capacitor starts steaming off whilst leaving the set working, thereby spreading consternation throughout the household (you know what I mean – those yellow ones). So it appeared to be a defective capacitor, and the circuit suggested that it might be C815 (1μF) which provides filtering between the driver transistor and the two modulator diodes. It didn't look an easy matter to get at it, so I suggested to Mr. Bore that he might like to call back later.

He seemed to hesitate, as though loath to leave the set in the hands of an incompetent idiot who couldn't even replace an h.t. rectifier without blowing up something else, but he eventually wandered off. So I called for coffee and had to make it myself as Honey Bunch was busy playing with a radio which was getting CB, with an interesting conversation about a Teddy Bear or something.

When I'd got up enough courage to tackle the suspect, which was hiding away at the front of the scan panel, I had to remove the tripler to reach it. I then found that I didn't have a 1μF capacitor with the correct voltage rating, so I ended up with two 2μF capacitors in series. This seemed to work all right, and I'd hardly replaced the back when the horror returned. Not the smoke or anything wrong with the set, but Mr. Bore himself.

"I though I'd better not stay away too long in case you might need a bit of help."

Repeat Performance

Hardly had he gone than a Rank Z718 was brought in with a no-go symptom. The h.t. feed was o.k., but something was preventing the line output stage from working. Unhooking the top retainers enabled us to get at the front of the right side panel, where just for fun we checked the same circuit (the EW modulator – not quite the same, but you know what I mean). The two diodes here are 5D5 and 5D6. 5D6 was faulty, and turned out to be an SKE something or other. Anyway we stuck in a BYX71, which is what the circuit actually said, and order was restored. Funny how things seem to go in cycles, isn't it?

If you get one Thorn 1500 in with poor sync for example, you can bet your life that there'll be at least two others close behind waiting to have their 47kΩ sync separator screen grid feed resistors replaced.

We've also had a run of solid-state GEC colour sets in recently (C2100 series), all with line output stage trouble where the 40V rectifier diode D601 (fed from a winding on the line output transformer) goes short-circuit. In goes another BYX71, underneath instead of on top. I wonder what it'll be next?